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REPORT

OF

THE COMMISSIONER-GENERAL FOR THE UNITED STATES

TO THE

INTERNATIONAL UNIVERSAL EXPOSITION,
PARIS, 1900.

VOLUME III.

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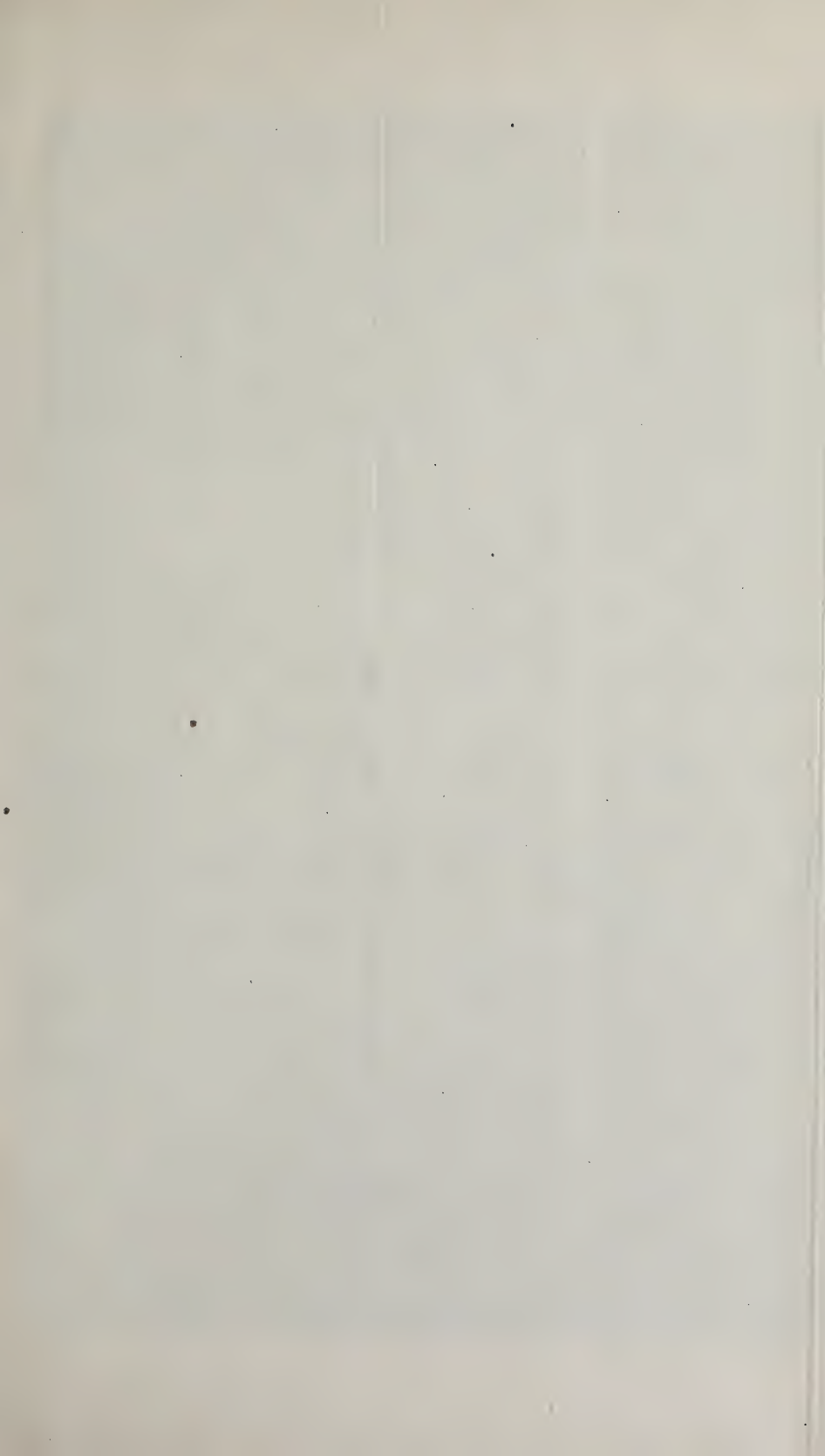
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REPORT OF THE DEPARTMENT OF LIBERAL ARTS
AND CHEMICAL INDUSTRIES.

GROUPS III AND XIV.

ALEXANDER S. CAPEHART, DIRECTOR.





14. PALACE OF MARINE NAVIGATION.

DEPARTMENT OF LIBERAL ARTS AND CHEMICAL INDUSTRIES.

[Groups III and XIV.]

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DEPARTMENT STAFF.

Alexander S. Capehart	Director.
Charles H. Simms	Assistant director.
(In charge publishers' building.)	
Oliver C. Hine	Expert.
(In charge offices.)	
John M. Lowe	Expert.
(In charge liberal arts section.)	
Joseph L. Hebert	Expert.
(Superintendent publishers' building.)	
James H. Shipley	Expert.
(In charge chemical section.)	
Frederic W. Gardner	Honorary expert.
Henry G. Roelker	Honorary expert.
Faust Moncheur	Attaché.
Marius Carpentier	Interpreter and translator.
George E. Butler	Secretary to the director.

CLASSIFICATION.

GROUP III.—APPLIANCES AND GENERAL PROCESSES RELATING TO LITERATURE, SCIENCE, AND ART.

CLASS 11.—*Topography — Various printing processes.*

[Equipment, processes, and products.]

1. Machinery and apparatus used in typography, lithography, copperplate printing, autography, engraving on copper, on zinc, etc. Machinery used for photo-mechanical printing. Equipment, apparatus, and products of type foundries, of stereotyping, etc. Machines for setting and distributing type. Special equipment for printing bank notes, postage stamps, etc. Typewriting machines. 2. Specimens, in black and in color, of typography, lithography, copperplate printing, and other methods of printing. Specimens of engravings and drawings obtained, reproduced, enlarged, or reduced by mechanical or photographic processes.

CLASS 12.—*Photography.*

[Equipment, processes, and products.]

1. Raw materials, instruments, and apparatus of photography. Equipment of photographic studios. 2. Negative and positive photography on glass, paper, wood, cloth, enamel, etc.¹ Photogravure in intaglio and in relief; photocolligraphy; photolithography. Stereoscopic prints. Enlarged and micrographic photographs. Color photography. Direct and indirect photo-color printing. Scientific and other applications of photography.

CLASS 13.—*Books, musical publications, bookbinding (equipments and products), newspapers, posters.*

New books and new editions of old books. Collections of works forming special libraries. Reviews and other periodicals. Newspapers. Posters. Drawings, atlases, albums. Musical publications. Equipment, processes, and products of making stitched books and of bookbinding.

CLASS 14.—*Maps and apparatus for geography and cosmography—Topography.*

Maps, charts, and atlases (geographical, geological, hydrographical, astronomical, etc.) Physical maps of all kinds. Topographical maps, flat or in relief. Terrestrial or celestial globes. Statistical works and tables. Tables and nautical almanacs for the use of astronomers and seamen.

CLASS 15.—*Instruments of precision—Coins and medals.*

[Appliances, processes, and products.]

Mathematical and scientific apparatus and instruments. Apparatus and instruments for practical geometry, land surveying, topography and geodesy; compasses, calculating machines, levels, mariner's compasses, barometers, etc. Apparatus and instruments for measuring, verniers, micrometer screws, dividing machines, sensitive balances for exact weighing, etc. Ordinary optical instruments. Astronomical instruments. Physical and meteorological instruments, etc. Instruments and apparatus for use in laboratories and observatories. Measures and weights of different countries. Equipment for the manufacture of coins and medals (appliances for

¹ For the award of prizes exhibitors will be divided into two sections, one comprising amateurs and savants, the other professionals.

weighing the metal, testing the standard of alloys, melting and casting, rolling, stamping out, milling, washing, verification of weight of coins, counting, striking and checking them before delivery; equipment for the preparation of stamps and dies, coins and medals; treatises upon coins, economical, statistical, etc.)

CLASS 16.—*Medicine and surgery.*

Appliances, instruments, and apparatus for work in anatomy, histology, and bacteriology. Anatomical models, normal and pathological; histological and bacteriological preparations. Apparatus for sterilizing instruments and appliances for dressing wounds. Instruments for general and special medical research. Instruments and apparatus for general, special, and local surgery. Appliances for dressing wounds. Apparatus for plastic and mechanical prosthesis; orthopaedic apparatus, apparatus for hernia; apparatus for medical gymnastics; material, instruments, and apparatus for special therapeutics. Instruments used in the practice of dentistry. Appliances for the use of the infirm, of invalids, and of lunatics. Chests and cases of instruments and medicines for the use of surgeons of the army and navy. Appliances for rendering aid to the wounded on the field of battle. Appliances for rendering aid to persons apparently drowned or asphyxiated. Instruments and appliances for veterinary surgery.

CLASS 17.—*Musical instruments.*

[Materials, processes, and products.]

1. Materials and processes for manufacturing musical instruments: Wind instruments, in brass or wood; stringed instruments; pianos, etc. 2. Wind instruments of metal or wood, having openings with or without keys, simple mouthpieces, pipes or reeds, with or without reservoirs of air. Metal wind instruments, plain or with lengthening pieces, slides, pistons, keys, or reeds. Wind instruments with keyboard; organs, accordions, etc. Stringed instruments without keyboard, played with the fingers or with a bow. Stringed instruments with keyboard: Pianos, etc. Instruments played by percussion or friction: Drums and cymbals. Automatic instruments: Barrel organs, bird organs, musical boxes, etc. Separate parts of musical instruments and orchestral appliances. Strings for musical instruments. Primitive, rude, or strange instruments.

CLASS 18.—*Theatrical appliances and equipment.*

Interior equipment of theaters. Special furniture. Arrangements for preventing and extinguishing fires. Scenery; curtains, metallic curtains, gauzes, nets; colors, brushes, palettes; cordage; special ironwork; lighting; electrical apparatus, candelabra, colored screens; apparatus for imitating flame, smoke, lightning, fireworks; projections, specters; phosphorescence. Machinery: Windlasses, drums, chests, traveling platforms, slides, trolleys, traps, counterweights, flies. Costumes: Special materials, printing on different materials, armor; jewelry; foot gear, dancing shoes; wigs, beards, making-up, paints for making-up. Properties: Reproduction of various phenomena, such as thunder, hail, wind, snow, gun firing; cardboard work of all kinds; furniture made in perspective.

GROUP XIV.—CHEMICAL INDUSTRIES.

CLASS 87.—*Chemical and pharmaceutical arts.*

[Equipment, processes, and products.]

1. Laboratory apparatus and utensils; enameler's lamps, blowpipes, presses, drying ovens, filters, electric furnaces. Apparatus and instruments for making industrial and commercial analyses. Equipment and processes used in the manufacture

of chemical products, superphosphates, soaps, candles, glycerin. . Apparatus and processes for the production by electrolysis of hydrogen peroxide, chlorine, hypochlorites, chlorates, soda, and various other chemicals. Equipment and processes used in the manufacture of vegetable essences, varnishes, commercial india rubber, substitutes for india rubber, and articles of gutta-percha. Equipment and processes used in treating the mineral substances useful for lighting, heating, or lubrication—coal, shale, petroleum, ozokerite, etc. Equipment and processes used in treating waste water from factories (by chemical and electrical methods) with a view of permitting their return to water courses. Equipment for charcoal works and the production of various derivatives; methylated spirit, acetone, acetic acid, tar. Apparatus and processes for the compression and liquefaction of gas. Apparatus and processes for the manufacture of artificial textiles. Appliances and processes used in the manufacture of pharmaceutical products. 2. Acids, alkalies, salts of every kind. Refined sulphur and derivatives from sulphur. Phosphorus. Hydrogen peroxide. Ozone. Sea salt and products of the treatment of the mother waters. Various products of chemical industries; wax and fatty substances; soap, candles, and glycerin; resins; tar and substances derived from it; glue and gelatin; essences, varnishes, various glazes, printing ink; blacking. Commercial india rubber; gutta-percha. Dyestuffs and pigments. By-products obtained from the treatment of mineral substances used for lighting, heating, and lubrication. Refined petroleum and paraffin. Products of charcoal burning. Alcohols, modified for industrial purposes. Liquefied gases. Artificial textile fabrics. Raw materials of pharmacy; drugs, simple and compounded.

CLASS 88.—*Manufacture of paper.*

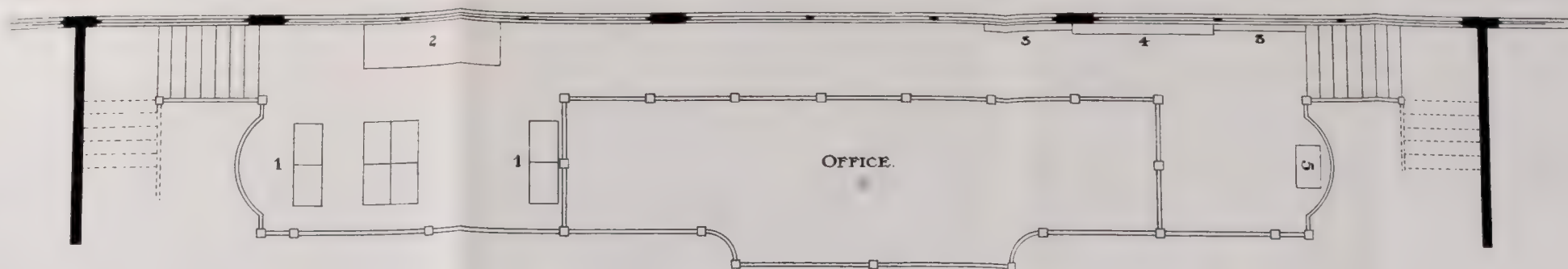
[Raw materials, equipment, processes, and products.]

1. Collections of raw materials used in the manufacture of paper and cardboard. 2. Equipment and processes used in the manufacture of paper by hand. Equipment and processes used in the manufacture of paper by machinery. Apparatus and processes for the making of pulp; pulp from rags (sorting, picking, and cutting; bolting, washing; lye washing, rinsing, and draining; beating, bleaching, and washing; refining, sizing, coloring, loading, etc.); pulp from straw, from esparto (sorting, crushing, chopping, lye washing, and washing; beating; bleaching; washing and draining, etc.); pulp produced mechanically from wood (grinding, purifying, and drying); pulp produced chemically or semichemically from wood (cutting up; lye washing; washing; reduction to pulp; bleaching, etc.); etc. Machines for producing endless paper. Apparatus for cutting, glazing, calendering, polishing. Appliances and processes for manufacturing special papers. Equipment and processes used in making cardboard. 3. Fine papers and cheap papers for books: China paper, Japan paper, imitation Japan paper, vellum, paper made with animal size, etc. Paper for newspapers and for posters. Papers for drawing, for photography, for map making. Paper for bank notes. Parchment. Paper for correspondence, note paper, envelopes. Cigarette paper. Tissue paper. Paper for confectionery, for artificial flowers. Packing and wrapping paper, waxed paper, oiled paper. Paper used in machine construction. Paper used in making fireworks and the use of explosives. Telegraph paper. Papier maché, compressed paper, mill boards, imitation of lacquer. Enameled paper. Bituminous paper. Parchment paper for envelopes and for endosmose. Filter paper used in breweries, etc. Cardboard of all kinds.

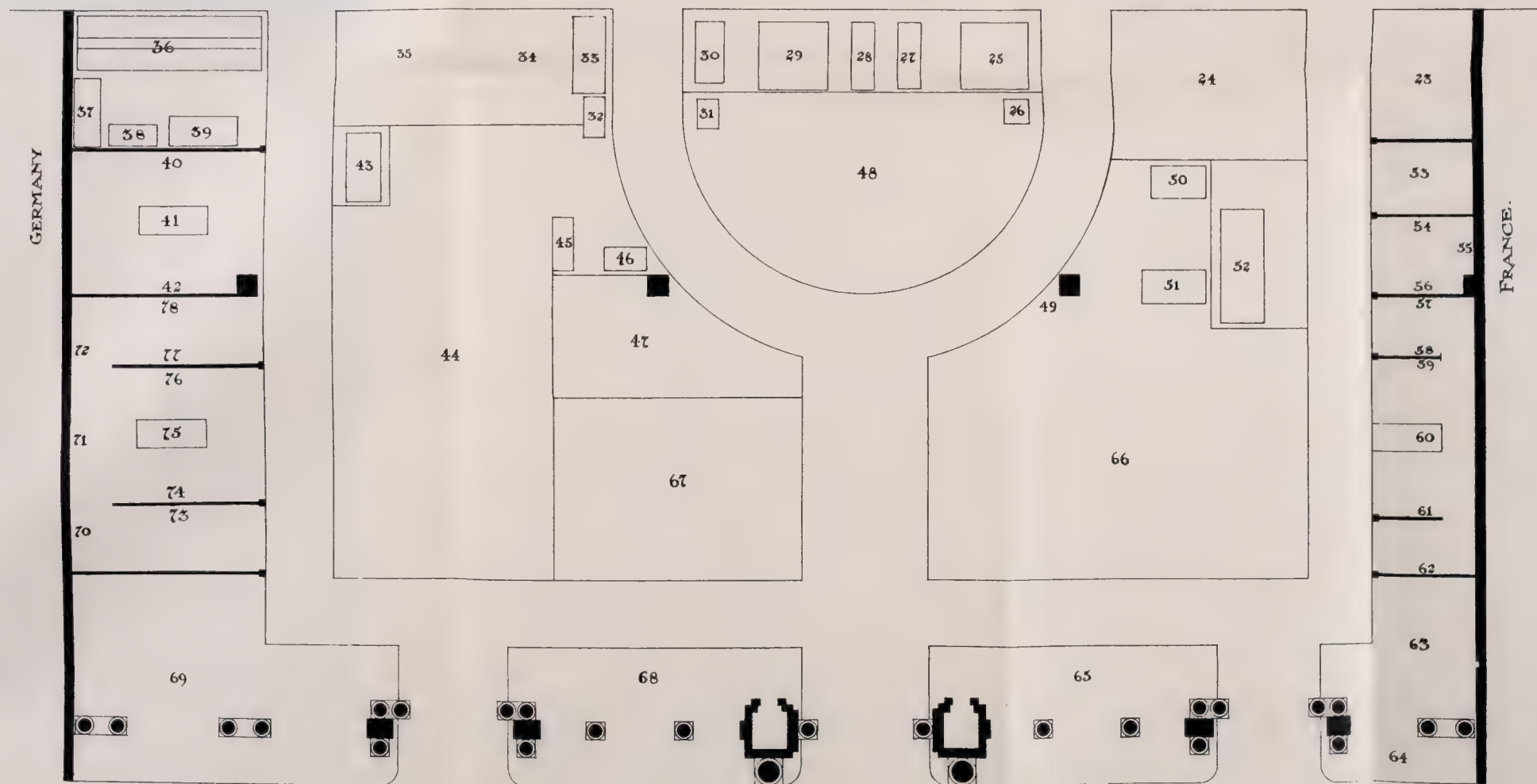
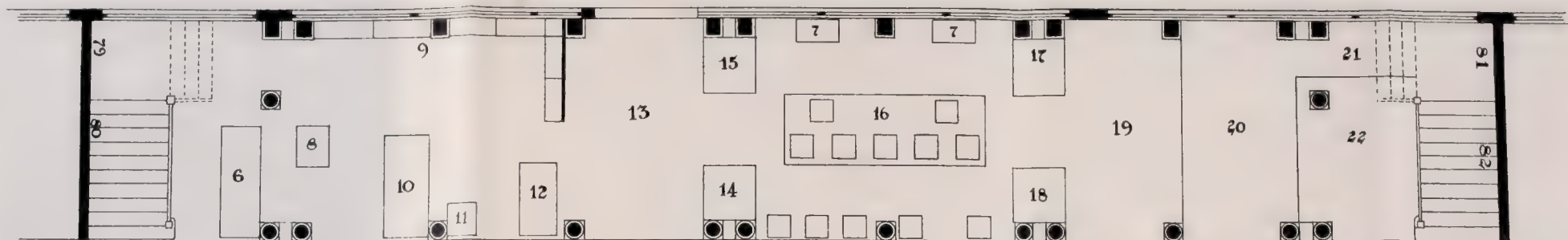
CLASS 89.—*Leather and skins.*

[Raw materials, equipment, processes, and products.]

1. Skins with the hair on; tannin and tannin extracts; raw materials used in preparing leather and skins. 2. Equipment and processes used in tanning, currying,



PLAN OF ENTRESOL.



PARIS EXPOSITION OF 1900.
PLAN OF INSTALLATION OF UNITED STATES SPACE
GROUND FLOOR PALACE OF EDUCATION AND LIBERAL ARTS.
GROUP III.

Scale of Feet 1

tawing, chamois dressing, and in general all operations used in curing leather and skins. 3. Tanned leather; tanned and curried leather; patent leather; morocco and kid leather; tawed leather; chamois leather; parchment.

CLASS 90.—*Perfumery.*

[Raw materials, equipment, processes, and products.]

1. Raw materials, such as essential oils, perfumes of flowers absorbed by fats, concentrated perfumes obtained by solvents or distilled water, etc.; raw material of French production; imported materials, raw or prepared. 2. Equipment for manufacture—machines for crushing or grinding, apparatus for infusion, presses, agitators for extracts, mixtures for pomatums and soaps, receivers, and various other utensils. 3. Manufactured products—soaps, toilet waters, perfumed oils, pomatums, scents, sachets, extracts and perfumes, perfumed powders, dentifrices, toilet vinegars, hair powders, cosmetics, hair dyes, etc.

CLASS 91.—*Tobacco and matches.*

[Equipment, processes, and products.]

1. Tobacco; culture and raw materials; equipment for manufacture; construction of tobacco factories; laboratory appliances; manufactured products. 2. Matches; raw materials; equipment for manufacture; construction of match factories; laboratory appliances; manufactured products.

KEY TO INSTALLATION, LIBERAL ARTS SECTION, GROUP III.

[See plan of installation of Group III, Champ de Mars.]

1. Collective exhibit of typewriting machines.
2. Two cases of natural-history specimens. George Lagai, M. D., New York.
- 3 and 4. Half-tone screens. Max Levy, Philadelphia.
5. Self-playing banjo. Charles B. Kendall, Boston.
6. Publications. The Century Company, New York.
7. Retrospective exhibit of the typewriting machine. Wyckoff, Seamans & Benedict, New York, and the Remington-Sholes Company, Chicago.
8. Publications. Funk & Wagnalls, New York.
9. Wall cases. Collective exhibit of publishing houses.
10. Publications. The J. B. Lippincott Company, New York.
11. Publications. The Blumenburg Press, New York.
12. Publications. George Barrie & Son, Philadelphia.
13. Minting machinery. The Ferracute Machine Company, Bridgeton, N. J.
14. Typewriter supplies. John Underwood & Co., New York.
15. Rotary duplicating machine. The Neostyle Company, New York.
16. Typewriter desks; typewriting machines in operation.
17. The Edison mimeograph. A. B. Dick Company, Chicago.
18. Typewriter supplies. Mittag & Volger, Parkridge, N. J.
19. Phonographs. The Columbia Phonograph Company, New York.
20. Dental apparatus and furniture. The Ritter Dental Manufacturing Company, Rochester, N. Y.
21. Musical instrument strings. The National Music String Company, New York.
22. Self-playing pianos. The Adek Manufacturing Company, New York.
23. Exhibit of moving-picture devices. S. Lubin, Philadelphia.
24. Self-playing upright pianos. Ludwig & Co., New York.
25. Copper and steel plate printing specimens. Tiffany & Co., New York.

26. Banking machine. American Arithmometer Company, St. Louis.
27. Typewriter counting attachments. B. M. Des Jardins, Hartford, Conn.
28. Coins and medals of the United States Bureau of the Mint, Treasury Department.
29. Precious stone folklore. George F. Kunz, New York.
30. Micrometers, verniers, etc. Brown & Sharpe Manufacturing Company, Providence,* R. I.
31. Counting devices. International Arithmachine Company, Chicago.
32. Specimens of dental work. J. H. Meyer, New York.
33. Invalid chairs. Invalid Chair Company, New York.
34. Orthopedics. Banning Orthopedic and Mechanical Therapeutic Company, Fort Wayne, Ind.
35. Specimens of dental work. F. D. Kelly, Peoria, Ill.
36. Specimens of engraving and printing, frames, and easels. Bureau of the Mint, Treasury Department.
37. France in American History. Pasadena Exhibition Association, Pasadena, Cal.
38. Publications. The United States Industrial Publishing Company, New York.
39. Coins, medals, and badges. The American Numismatic and Archiological Society, New York.
40. Copley prints. Curtis & Cameron, Boston.
41. Government exhibits of printing, Executive Departments.
42. Copley prints. Curtis & Cameron, Boston.
43. Trusses. The Rorick Air Cushion Truss Company, Washington, D. C.
44. Surgical theater. The Kny-Scheerer Company, New York.
45. Orthodontia. Victor H. Jackson, M. D., New York.
46. Rubber gloves, etc. The Miller Rubber Company, Akron, Ohio.
47. Dental furniture and supplies. The Harvard Company, Canton, Ohio.
48. Astronomical observatory. Warner & Swasey, Cleveland, Ohio; Professors Brashear, Hastings, Rowland, and associates.
49. Specially constructed banjo. Icilio Consalvi, Boston.
50. Zithers and harps. Flagg Manufacturing Company, Boston.
51. Mandolins and guitars. Angello Mannello, New York.
52. Stringed and vibrating instruments. Joseph Bohman, Chicago.
53. Photographs of American Indians. F. A. Rinehart, Omaha, and miscellaneous exhibits on walls.
54. Stereoscopes. H. C. White & Co., North Bennington, Vt.
55. Specimens of dental work. National Institute of Dental Pedagogy.
56. Miscellaneous exhibits—specimens of printing.
57. Miscellaneous exhibits—specimens of printing.
58. Miscellaneous exhibits—specimens of printing.
59. Miscellaneous exhibits—specimens of printing.
60. Violins. Knute Reindahl, Chicago.
61. Miscellaneous exhibits—specimens of printing.
62. Miscellaneous exhibits—specimens of printing.
- 63 and 64. Typewriting machines—Smith Premier Typewriter Company, Syracuse, N. Y., and the Remington Standard Typewriter Company, New York.
65. Piano fortes—The Baldwin Piano Company, Cincinnati.
66. Piano fortes and organs—the Baldwin Piano Company, Cincinnati, and the Hamilton Organ Company, Chicago.
67. Dental instruments and supplies—Gideon Sibley, Philadelphia.
68. Cash registers—the National Cash Register Company, Dayton, Ohio.
69. Photographic material and supplies. Eastman Kodak Company, Rochester, N. Y.
70. Wall exhibits—specimens of photography.
71. Wall exhibits—specimens of photography.

- 72. Wall exhibits—specimens of photography.
- 73. Wall exhibits—specimens of photography.
- 74. Wall exhibits—specimens of photography.
- 75. Specimens of printing and binding—Executive Departments, United States Government.
- 76. Wall exhibits—specimens of photography.
- 77. Wall exhibits—specimens of photography.
- 78. Wall exhibits—specimens of photography.
- 79. Specimens of printing—Government Departments.
- 80. Specimens of printing—Government Departments.
- 81. Enlarged colored photograph—Chicago Auditorium Association.
- 82. Specimens of lithography—(Rosa Bonheur's Horse Show) W. J. Morgan & Co., Cleveland, Ohio.

KEY AND TITLES TO ILLUSTRATIONS AND VIEWS, GROUPS III AND XIV.

- C- 1. Liberal arts façade, Champ de Mars. View from southeast.
- C- 2. Liberal arts façade. View from northeast.
- C- 3. Rear of façade, liberal arts section, Champ de Mars, looking north.
- C- 4. Looking north, rear of façade, liberal arts section, Champ de Mars.
- C- 5. Looking north through rear of liberal arts section, Champ de Mars.
- C- 6. View into surgical theater; installation surrounded by plate glass, liberal arts section, Champ de Mars.
- C- 7. View into photographic installation, liberal arts section, Champ de Mars.
- C- 8. Dental furniture and supply installation, liberal arts section, Champ de Mars.
- C- 9. Entresol, rear of liberal arts section, Champ de Mars, looking south.
- C-10. Installation in entresol, liberal arts section, Champ de Mars, looking north.
- C-11. Chemical industries section, Champ de Mars, looking northwest, showing booth pavilion at south end and arch and tower at center of section.
- C-12. Chemical industries section, Champ de Mars, looking southeast and showing booth pavilion at north end and tower at center of section.
- C-13. Chemical industries section, Champ de Mars, looking east, showing arches at center of section.
- C-14. View showing southwest corner of publishers' building, Esplanade des Invalides.
- C-15. View of south side of publishers' building, Esplanade des Invalides.
- C-16. Looking west, north aisle, publishers' building, Esplanade des Invalides.
- C-17. North aisle of publishers' building, looking east, Esplanade des Invalides.
- C-18. Goss newspaper press and center view of publishers' building, Esplanade des Invalides.
- C-19. Installation of Mergenthaler Linotype machines, publishers' building, Esplanade des Invalides.
- C-20. South façade, Mutual Life Insurance Company's installation, publishers' building, Esplanade des Invalides.
- C-21. Interior view, Mutual Life Insurance Company's installation, publishers' building, Esplanade des Invalides, looking west.
- C-22. New York Equitable Life Assurance Society's installation (exhibit facing west), publishers' building, Esplanade des Invalides.
- C-23. New York Equitable Life Assurance Society's installation, publishers' building, Esplanade des Invalides, viewing exhibit from northwest.
- C-24. Installation of liquid-air plant, department of machinery, Champ de Mars. The Tripler Liquid Air Company.

CATALOGUE OF EXHIBITORS IN DEPARTMENT OF LIBERAL ARTS AND
CHEMICAL INDUSTRIES, GROUPS III AND XIV.

GROUP III.—APPLIANCES AND GENERAL PROCESSES RELATING TO LITERATURE, SCIENCE, AND ART.

CLASS 11.—*Typography—Various printing processes.*

EQUIPMENT, PROCESSES, AND PRODUCTS.

Addressograph Company, 173 South Canal street, Chicago: Machines for addressing envelopes, wrappers, etc., and machine for making Printing plates.

American Postal Machine Company, Boston, Mass.: Canceling machines.

American Society of National Advertisers, Chicago: Collection of hangers, calendars, etc., of advertisers of the United States.

Contributors: American Lithograph Company, New York City, calendars; California Fig Syrup Company, San Francisco, Cal., lithograph; Drummond Tobacco Company, St. Louis, Mo., lithograph; Dunston, G. H., & Co., Buffalo, N. Y., lithograph; Fairbank, N. K., & Co., Chicago, Ill., calendars and signs; Gillim Print Company, New York City, theatrical lithographs; Gray Lithograph Company, New York City, calendar; Greve Lithograph Company, Milwaukee, Wis., lithographs; Harter Medicine Company, Dayton, Ohio, lithograph; Hawes Hats, New York City, lithographs; Gilson Company, The, New York City, lithographs; Hood, C. I., & Co., Lowell, Mass., lithographs; Kaufmann & Strauss Company, New York City, lithographs; Leggett & Myers, St. Louis, Mo., lithograph; Liebig Company, New York City, advertising cards; Liebig Extract of Beef Company, New York City, lithograph; Liebig Extract of Meat Company, New York City, lithograph; Matthews-Northrup Company, Buffalo, N. Y., lithograph; Michigan Stove Company, Chicago, Ill., lithograph; Niagara Lithograph Company, Buffalo, N. Y., lithographs and calendars; Ottman, J., Lithograph Company, New York City, lithographs; Pond's Extract Company, New York City, advertising cards; Pope Manufacturing Company, Hartford, Conn., lithograph; Prescott, J. L., & Co., New York City, lithograph; Rogers & Wells, Chicago, Ill., calendars; Sherwood Lithograph Company, Chicago, Ill., lithograph; Street & Smith, New York City, lithograph; Swift & Co., Chicago, Ill., lithographs; Witter, J. C., New York City, lithograph.

American 3 Color Company, 161-169 South Canal street, Chicago: Prints produced by three-color process.

American Type Founders' Company, 25 William street, New York City: Type, type founders' supplies, modern composing, imposing, and commercial printing office.

American Writing Machine Company, 316 Broadway, New York: New Century typewriting machine.

Babcock Printing Press Manufacturing Company, New London, Conn.: Babcock flat-bed cylinder printing press.

Barnhart Bros. & Spindler, Great Western Type Foundry, 185 Monroe street, Chicago: Type, type founders' supplies, modern composing, imposing, and commercial printing office.

Barr-Fyke Canceling Machine Company, Kansas City, Mo.: Canceling machine.

Barrie, George, & Son, 1313 Walnut street, Philadelphia, Pa.: Engravings, etchings, and color facsimiles.

Barry Postal Supply Company, Oswego, N. Y.: Canceling machine.

Blickensderfer Manufacturing Company, The, Stamford, Conn.: Blickensderfer typewriting, electrical writing, and cipher code machines.

- Bowen, William M. P., 57 Waterman street, Providence, R. I.: Carbon holder for manifold typewriting.
- Bureau of Engraving and Printing, U. S. A., Washington, D. C.: United States money, bonds, certificates, postal and revenue stamps.
- Campbell Printing Press Manufacturing Company, New York: Campbell flat-bed cylinder printing press.
- Chandler & Price Company, Cleveland, Ohio: Gordon printing presses, composition rollers, chases, etc.
- Chicago Colortype Company, 1205 Roscoe street, Chicago: Three-color process; reproductions from drawings of articles of merchandise.
- Chicago Writing Machine Company, 96 Wendell street, Chicago: Typewriting machines; Munson interchangeable steel type wheel.
- Columbia Typewriter Manufacturing Company, The, 43 West One hundred and sixteenth street, New York City: Columbia bar-lock typewriting machines.
- Cottrell, C. B., & Sons Company, 41 Park Row, New York: High-speed Cottrell four-roller two-revolution printing press.
- Densmore Typewriter Company, 309 Broadway, New York: Densmore typewriting machines. The five styles of machines shown all have the unique ball-bearing type bars.
- Des Jardins, B. M., Hartford, Conn.: Adding attachment for typewriting machines.
- Des Jardins Type Justifier Company, The, Hartford, Conn.: Automatic machines for justifying type in connection with setting and distributing type.
- Dick Company, A. B., 154 Lake street, Chicago: The Edison mimeograph.
- Doremus Canceling Machine Company, St. James Building, Broadway, New York: Canceling machine.
- Duncan, J. S., 173 South Canal street, Chicago: Graphotype machine for making metal address plates; rubber type made from metal molds.
- Durant, W. N., 237 Twenty-second street, Milwaukee, Wis.: Counting machines for use on printing presses; line-casting and other machines.
- Frank Leslie Publishing House, 143 Fifth avenue, New York: Original art sketches in water color, wash drawing, pen and ink specimens.
- Franklin Typewriter Company, 320 Broadway, New York City: Franklin typewriting machines.
- Gerry & Murry, 31 Broad street, New York: Reproductions of typewritten and auto-graph letters.
- Goss Printing Press Company, The, Sixteenth street and Ashland avenue, Chicago: Goss straight-line multiple newspaper perfecting printing press.
- Hamilton Manufacturing Company, Two Rivers, Wis.: Wood type, ornaments; printing house furniture and suppliss.
- Hammond Typewriter Company, The, 537-551 East Sixty-ninth street, New York City: Hammond typewriting machines.
- Harris Automatic Press Company, Niles, Ohio: Rapid automatic job printing presses.
- Heinicke Fiegel Lithographing Company, First and Chestnut streets, St. Louis, Mo.: Specimens of commercial lithography.
- Hempel & Dingens, Buffalo, N. Y.: Printers' mechanical quoins.
- Imperial Manufacturing Company, Elkhart, Ind.: Cardboard stencil-cutting machine.
- Inland Printer Company, The, 214 Monroe street, Chicago: Specimens of printing from The Inland Printer.
- Jewett Typewriter Company, Des Moines, Iowa: Duplex and Jewett typewriting machines.
- Lambert Typewriter Company, The, 83 Washington street, Brooklyn, N. Y.: Lambert typewriting machines.
- Langston Monotype Machine Company, Washington, D. C.: Keyboard to manual process and automatic type casting and composing machines.

- Latham Machinery Company, 197 South Canal street, Chicago: "Monitor" perforating machine for printing-house work.
- Levy, Louis Edward, 824 North Eighth street, Philadelphia, Pa.: Acid blast method of chemical engraving, and machinery for its application.
- Mergenthaler Linotype Company, New York: Machines for the mechanical composition of type.
- Meyercord Company, The, Chamber of Commerce, Chicago: Decalcomania transfer ornaments in both vegetable and mineral colors.
- Miehle Printing Press and Manufacturing Company, 75 North Clinton street, Chicago: Miehle two-revolution flat-bed book and color printing press.
- Miehle, Robert, Chicago: Improvement in bed motion and sheet delivery of printing presses.
- Mitchell, John J., Company, The, 105 Fifth avenue, New York: Specimens of printing in the production of fashion plates.
- Mittag & Volger, Park Ridge, N. J.: Typewriter carbon papers, ribbons, and oils; pencil and stylus carbon papers; stamping ribbons and metal stamp ink.
- Morgan, W. J., & Co., Cleveland, Ohio: Lithographs—1. Reproduction of Rosa Bonheur's painting, The Horse Fair. 2. Portrait of President McKinley.
- National Association of Photo-Engravers, 175 Clark street, Chicago: Mezzotint impression, photomechanical reproduction processes.
- National Machine Company, Hartford, Conn.: Gally Universal printing press.
- Neostyle Manufacturing Company, The, 102 Church street, New York: Various types of Neostyle duplicating machines.
- Oliver Typewriter Company, The, Washington and Dearborn streets, Chicago: Oliver typewriting machines.
- Osgood Art Colortype Company, Woman's Temple, Chicago: New process for color printing.
- Pittsburg Writing Machine Company, Pittsburg, Pa.: Pittsburg visible writing machines.
- Quigley Furniture Company, Whitesboro, N. Y.: Adjustable tables for typewriters.
- Remington-Sholes Company, 127 Rees street, Chicago: Remington-Sholes typewriting machines; publication.
- Rouse, Harry B., 1163 North Seventieth avenue, Chicago: Printers' lead and rule cutters and printers' adjustable composing sticks.
- Slade & Hicks, Chicago, Ill.: Lithography.
- Smith-Premier Typewriter Company, The, Syracuse, N. Y.: Smith-Premier typewriting machines; publication.
- Smith, R. H., Manufacturing Company, Springfield, Mass.: Easy sign markers, rubber type, and office stamps.
- Tenney, J. F., Company, 70 Madison street, Chicago: Rubber type in fonts, price and sign markers' outfits.
- Tiffany & Co., Union Square, New York: Copper and steel plate and intaglio printing; stamping and embossing from dies.
- Underwood, John, & Co., 30 Vesey street, New York City: Typewriter supplies.
- United States Government Printing Office, Washington, D. C.: Specimens of typography, reports of executive departments, scientific publications, etc.
- Unitype Company, The, New York City: Simplex typesetting machine.
- Verbeck, George J., Michigan avenue and Madison street, Chicago: Bank-note engraving.
- Wagner Typewriter Company, 220 Broadway, New York City: The Underwood typewriting machines.
- Wesel, F., Manufacturing Company, New York City: Printers' brass galleys.
- Western Bank Note and Engraving Company, Chicago: Specimens of steel-plate engraving and printing.
- Wetter, Joseph, & Co., 515 Kent avenue, Brooklyn, N. Y.: Numbering machines.

Williams Typewriter Company, Derby, Conn.: Williams typewriting machines.
 Wyckoff, Seamans & Benedict, 327 Broadway, New York City: Remington typewriting machines; publication.
 Yesbera Manufacturing Company, Toledo, Ohio: Adjustable combination tables for exhibition purposes.
 Yost Writing Machine Company, 320 Broadway, New York: Yost typewriting machines.

CLASS 12.—*Photography.*

EQUIPMENT, PROCESSES, AND PRODUCTS.

American Aristotype Company, Jamestown, N. Y.: Photographic prints.
 American 3 Color Company, 91 Plymouth place, Chicago, Ill.: Commercial catalogues and art publications.
 Baker Art Gallery, 106 South High street, Columbus, Ohio: Genre photographs.
 Bausch & Lomb Optical Company, Rochester, N. Y.: Lenses, shutters, and fine photographic instruments; photographs.
 Bolles, C. E., 244 Fulton street, Brooklyn, N. Y.: Yachting and marine photographs.
 Brenner, W. N., 14-16 East Fourth street, Cincinnati, Ohio: Portraiture photography.
 Burton Photography Company, 9 West Forty-second street, New York: Yachting photographs.
 Byron, Joseph, 1286 Broadway, New York City: Flash-light photographs of scenes in American theaters.
 Chicago Colortype Company, 1205 Roscoe street, Chicago, Ill.: Three-color process; reproductions from drawings of articles of merchandise.
 Corne, W. F., 76 State street, Boston, Mass.: Framed photograph, Mater Dolorosa.
 Curtis & Cameron, Boston, Mass.: Photographs known as Copley prints.
 Dodge, Charles Richards, 30-36 Vermont avenue, Washington, D. C.: Artistic photography.
 Eastman Kodak Company, Rochester, N. Y.: Kodaks, photographic apparatus, and pictures.
 Johnston, Fannie B., Washington, D. C.: Artistic portraiture photography.
 Lawrence, George R., 2701 Indiana avenue, Chicago: Photographs by artificial light.
 Levy, Max, 1213 Race street, Philadelphia, Pa.: Screens for half-tone process and proofs from engravings.
 Lubin, Siegmund, 21 South Eighth street, Philadelphia, Pa.: Apparatus and materials for obtaining and reproducing cinegraph photography.
 Nepera Chemical Company, Nepera Park, N. Y.: Photographic prints made on Nepera Chemical Company's products; demonstration of new velox products.
 Osgood Art Colortype Company, Woman's Temple, Chicago, Ill.: New process for color printing.
 Photo-Materials Company, Rochester, N. Y.: Photographs.
 Popular Photograph Company, 114 Bleecker street, New York: Apparatus for instantaneous photography, known as Nodark.
 Rinehart, F. A., Omaha, Nebr.: Photographs of American Indians.
 Schumacher, F. G., Los Angeles, Cal.: Photographs.
 Steckel, George, Los Angeles, Cal.: Studio photography.
 Tabor Photographic Company, San Francisco, Cal.: Photographs and carbon prints.
 White Company, The H. C., North Bennington, Vt.: Patented dark-chamber stereoscopes and stereoscopic views.

CLASS 13.—*Books, musical publications, bookbinding (equipments and products), newspapers, posters.*

Advance Publishing Company, 215 Madison street, Chicago: Publication—The Advance.
 American Baptist Publishing Society, 1420 Chestnut street, Philadelphia, Pa.: Publications—The Advance Quarterly and various religious publications.

- American Druggist Publishing Company, 68 West Broadway, New York: Publication—American Druggist and Pharmaceutical Record.
- American Electrician Company, 120 Liberty street, New York City: Publication—American Electrician.
- American Florist Company, 324 Dearborn street, Chicago: Publication—The American Florist.
- American Homes Publishing Company, Knoxville, Pa.: Publication—American Homes.
- American Lutheran Publication Board, Pittsburg, Pa.: Publications—Lutheran Guide and Lutheran Witness.
- American Machinist Press, 218 Williams street, New York City: Publication—American Machinist.
- American Medical Association, 61 Market street, Chicago: Publication—Journal American Medical Association.
- American Newspaper Directory, New York: Directory of American Newspapers.
- American Peace Society, The, 3 Somerset street, Boston, Mass.: Publication—The Advocate of Peace.
- American Seamen's Friend Society, The, 76 Wall street, New York City: Publication: The Sailors' Magazine.
- American Shipbuilder, 7 Coenties slip, New York: Publications.
- American Society for Prevention of Cruelty to Animals, Madison avenue and Twenty-sixth street, New York City: Publication—Our Animal Friends.
- American Society of National Advertisers, Chicago: Collection of posters and cover designs of advertisers of the United States.

Contributors: Achert & Henckel Lithograph Company, Cincinnati, Ohio, posters; Adams & Westlake Company, Chicago, Ill., posters; Ainslee & Company, Howard, New York City, cover designs; American Cereal Company, Chicago, Ill., posters; American Lithograph Company, New York City, posters; Art Amateur, The, New York City, posters; Baker, Walter, & Co., Dorchester, Mass., posters; Bien, Julius, & Co., New York, posters; Bookman, The, New York City, posters; Century Company, The, New York City, cover designs; Courier Company, Buffalo, N. Y., posters; Denslow, W. W., Chicago, Ill., posters; Dew Drop Cigar Company, New York City, poster; Dunston, G. H., & Co., Buffalo, N. Y., cover designs; Edwards, Deutch & Heitman, Chicago, Ill., poster; Fairbank, N. K., Company, Chicago, Ill., poster; Franco-American Soup Company, New York City, cover design; Gillen Lithograph Company, Philadelphia, Pa., posters; Greve Lithograph Company, Milwaukee, Wis., posters; Harper Brothers, New York City, posters; Hart, Shafner & Marx, Chicago, Ill., posters; Hood, C. I., & Co., Lowell, Mass., posters; Inland Printer Company, The, Chicago, Ill., poster; Kaufmann & Strauss Company, New York City, posters; Ketterlinus Lithograph Company, Philadelphia, Pa., posters; Leggett & Meyers, St. Louis, Mo., poster; Liberty Cycle Company, Bridgeport, Conn., poster; Liebig Extract of Meat Company, New York City, posters; Michigan Stove Company, Chicago, Ill., poster; Niagara Lithograph Company, Buffalo, N. Y., posters; Orcutt Lithograph Company, New York City, posters; Ottman, J., Lithograph Company, New York City, posters; Pabst Brewing Company, Milwaukee, Wis., poster; Pond's Extract Company, New York City, poster; Prang, L., & Co., Boston, Mass., cover design; Pyle, James, New York City, posters; Rogers & Wells, Chicago, Ill., poster; Round Oak Stove Works, Dowagiac, Mich., poster; Sherwood Lithograph Company, Chicago, Ill., posters; Soper, J. H., Gardner, New York City, cover design; Sterling Remedy Company, Attica, Ind., posters; Stokes, Frederick A., & Co., New York, posters; Street & Smith, New York City, cover design; Strowbridge Lithograph Company, Cincinnati, Ohio,

posters; Thomas & Wylie Lithograph Company, New York, poster; Walker, George H., & Co., Boston, Mass., posters; Wellman & Dwyer Tobacco Company, St. Louis, Mo., poster; Winship & Co., Chicago, Ill., poster; Woman's Home Companion, Springfield, Ohio, cover designs.

Andrew, Thomas H., 811 Western avenue, Seattle, Wash.: Publication—The American Forester.

American 3 Color Company, 91 Plymouth place, Chicago, Ill.: Commercial catalogues and art publications.

Angus Sinclair Company, 95 Liberty street, New York City: Publication—Locomotive Engineering.

Anthony, E. & H. T., & Co., 591 Broadway, New York: Publication—Anthony's Photographic Bulletin.

Armour & Co., Chicago, Ill.: Poster calendar.

Aull, Elbert H. & Co., Newberry, S. C.: Publications.

Ayers, N. W., & Co., Times Building, Philadelphia, Pa.: Newspaper Directory.

Barnes, A. S., & Co., 156 Fifth avenue, New York: Publication.

Barrie, George, & Son, 1313 Walnut street, Philadelphia, Pa.: Publications; printing, binding, and reproductions.

Benjamin, W. E., 22 West Thirty-third street, New York City: Publications.

Benz, August, 813 Davis street, Evanston, Ill.: Publication.

Bergstresser, J. C., 339 Fifth avenue, Pittsburg, Pa.: Publication—Insurance World.

Bettelheim, E. S., 1441 Broadway, New York City: Publication—New York Democratic News.

Bill, Edward Lyman, 3 East Fourteenth street, New York City: Publication—Music Trade Review.

Birmingham, Ernest F., Park Row Building, New York: Publication—The Fourth Estate.

Blumenberg Press, 214 Williams street, New York: Books, publications, catalogues, artistic prints.

Bohn, H. J., & Bro., 324 Dearborn street, Chicago: Publication—The Hotel World.

Bolton, W. E., Woodward, Okla.: Publication—Live Stock Inspector.

Bonner's, Robert, Sons, New York: Publication—Ledger Monthly.

Book-Keeper Publishing Company, Limited, The, Buhl Block, Detroit, Mich.: Publication—The Book-Keeper.

Bowen, Clarence W., 130 Fulton street, New York City: Publication—The Independent.

Bowker, R. R., 59 Duane street, New York City: Publication—Publishers' Weekly.

Bowles, J. M., 234 Congress street, Boston, Mass: Publications—Modern Arts, and Arts and Crafts.

Branday, F. C., Whitneys Point, N. Y.: Publication—Practical Poultryman.

Brewers' Journal, The, 24 Park place, New York City: Publication—The Brewers' Journal.

Broadway Publishing Co., 1123 Broadway, New York: Publication—Broadway Magazine.

Brooklyn Daily Eagle, The, Brooklyn, N. Y.: Guide to Paris Exposition.

Brush and Pencil Publishing Company, The, 215 Wabash avenue, Chicago, Ill.: Publication.

Bureau of the American Republics, Washington, D. C.: Commercial directory.

Butterick Publishing Company, Limited, 17 West Sixteenth street, New York: Publication—The Delineator.

Butterworth, T., 152 Fiftieth street, Chicago: Publication—The Live Stock Journal.

California Fruit Grower, 320 Sansome street, San Francisco, Cal.—Publications.

Calla, Max & Co., 237 Dock street, Philadelphia, Pa.: Publications—Presbyterian, and Reformed Review.

- Campbell, J. B., Monon Building, Chicago: Publication—History of the Paris Exposition of 1900 and of the Chicago Exposition.
- Campbell's Illustrated Journal, Monon Building, Chicago: Illustrated publication.
- Carl, William C., 34 West Twelfth street, New York City: Pamphlets, subject, The Church Organ.
- Cassell & Co., Limited, 9 West Eighteenth street, New York City: Publication—Cassell's Magazine.
- Catholic Standard and Times Publishing Company, The, 211 South Sixth street, Philadelphia, Pa.: Publication.
- Central Seventh-Day Adventist Publishing Association, Battle Creek, Mich.: Publication—Advent Review and Sabbath Herald.
- Century Company, The, Union Square, New York: The Century Magazine, St. Nicholas; original drawings and manuscripts. Paris, 1889, Grand prix.
- Chandler, A. D., 11 Warren street, New York City: Publication—North American Review.
- Chandler & Price Company, Cleveland, Ohio: Paper cutter.
- Chandler, Hannibal H., & Co., Chicago: Publication—The Farmer's Review.
- Chapple, Joe Mitchell, 71 Bedford street, Boston, Mass.: Publication—National Magazine.
- Chassaignac & Dyer, Drs., 163 University place, New Orleans, La.: Publication—New Orleans Medical and Surgical Journal.
- Chicago Horseman Newspaper Company, 358 Dearborn street, Chicago: Publication—The Horseman.
- Christian Publishing Association, Dayton, Ohio: Publication—Herald of Gospel Liberty.
- Church, W. C. & F. P., 93 Nassau street, New York City: Publication—United States Army and Navy Journal.
- Churchman Company, The, 47 Lafayette place, New York: Publication—The Churchman.
- Clark, Charles L., 10 Pacific avenue, Chicago: Publication—Grain Dealers' Journal.
- Clissold, H. R., 188 Madison street, Chicago: Publication—Bakers' Helper.
- Cobb, Benjamin F., 184 LaSalle street, Chicago: Publication—The Redford Review.
- Colby, Clara Bewick, Washington, D. C.: Publication—The Woman's Tribune.
- Cole, Frank B., Tacoma, Wash.: Publication—West Coast and Puget Sound Lumberman.
- Colliery Engineering Company, The, Scranton, Pa.: Publication—Science and Industry, Mines and Minerals.
- Columbia University, New York City: Publication—School of Mines Quarterly.
- Conant, William Cowper, 466 West One hundred and fifty-first street, New York City: Publications—Salvation, Modern Medical Science.
- Confectioners' Journal Publishing Company, 209 South Sixth street, Philadelphia, Pa.: Publication—Confectioners' Journal.
- Connecticut Magazine Company, Hartford, Conn.: Publication—Connecticut Magazine.
- Craig, E. H., 63 Beach street, New York City: Publication—Sewing Machine Times.
- Criterion Publishing Company, 13 Pacific avenue, Chicago: Publications—Mida's Criterion; Mida's Illustrated Magazine.
- Criterion Publishing Company, 156 Fifth avenue, New York City: Publication—Criterion.
- Crouse, J. N., D. D. S., 2231 Prairie avenue, Chicago: Publication—The Dental Digest.
- Curtis Publishing Company, The, 421 Arch street, Philadelphia, Pa.: Publication—The Ladies' Home Journal.

- Cycle Trade Publishing Company, Heed Building, Philadelphia, Pa.: Publication—Cycle and Automobile Trade Journal.
- Daily Drivers: Publication.
- De Castello, Rev. S. M., 888 South Kedzie avenue, Chicago: Publication—Krestansky Posel.
- Delano Publishing Company, The, T. H., 102 Chambers street, New York City: Publication—Tobacco.
- De Lestry, Edmund Louis, St. Paul, Minn.: Publication—De Lestry's Western Magazine.
- De Puy, Clarence C., 320 East Onondaga street, Syracuse, N. Y.: Publication—American Poultry Advance.
- Dexter Folder Company, Pearl River, N. Y.: Machines for folding books and magazines.
- Dexter, Marie L., 853 Carnegie Hall, New York City: Publication—The Parisian.
- Dixie Miller, Nashville, Tenn.: Publication.
- Dodd, Mead & Co., 149 Fifth avenue, New York City: Publication—The Bookman.
- Dominion Company, The, 334 Dearborn street, Chicago: Publication—Facts and Fiction.
- Dowst Brothers Company, 30 South Clinton street, Chicago: Publication—National Laundry Journal.
- Dunlap, John R., 122 Liberty street, New York: Publication—The Engineering Magazine.
- Dustin, William S., Dwight, Ill.: Publication—The Banner.
- Eastern Mennonite Conference, Schwenksville, Pa.: Publication—The Mennonite.
- Educational Publishing Company, 50 Bromfield street, Boston, Mass.: Publications—Popular Education and Primary Education.
- Educational Specialty Company, Cleveland, Ohio: The Chautauqua Literary File.
- Edwards, Dr. London B., Richmond, Va.: Publication—Virginia Medical Semi-Monthly.
- Electrical Review Publishing Company, 41 Park Row, New York City: Publication—Electrical Review.
- Electrical World and Engineer, 120 Liberty street, New York City: Publication.
- Engelhard, G. P., 358 Dearborn street, Chicago: Publication—Western Druggist.
- Engineering Magazine, 120 Liberty street, New York: Publication.
- Engineering Mechanics Publishing Company, Philadelphia, Pa.: Publication—Engineering Mechanics.
- Engineering News Publishing Company, 220 Broadway, New York: Publication—Engineering News and American Railway Journal.
- Epitomist Publishing Company, Indianapolis, Ind.: Publication—Agricultural Epitomist.
- Era Publishing Company, Chicago: Publication—Medical Era.
- Estes, Dana & Co., 208 Summer street, Boston, Mass.: Books, bookbinding.
- Ezekiel, Herbert T., Richmond, Va.: Publication—The Bi-Monthly Guild.
- Farm and Ranch Publishing Company, Dallas, Tex.: Publication—Farm and Ranch.
- Farm Implement News Company, 701 Masonic Temple, Chicago: Publication—Farm Implement News.
- Farmers' Voice, The, 334 Dearborn street, Chicago: Publication—The Farmers' Voice.
- Express Gazette, Cincinnati, Ohio: Publications.
- Fassett, Charles Wood, Sixth and Charles streets, St. Joseph, Mo.: Publications—American Medical Journalist, Medical Herald.
- Fassett, Herbert S., 263 Washington Boulevard, Chicago: Publication—The Western Undertaker.

- Fern Bulletin Company, Binghamton, N. Y.: Publication—The Fern Bulletin.
- Finkel, B. F., Springfield Mo.: Publication—American Mathematical Monthly.
- Fishing Gazette, 203 Broadway, New York: Publication.
- Fitzgibbon-Clark, Mrs., St. Louis, Mo.: Publication—St. Louis and Canadian Photographer.
- Forest and Stream Publishing Company, 346 Broadway, New York City: Publication—Forest and Stream.
- Frank Leslie Publishing House, 143 Fifth avenue, New York City: Publication—Frank Leslie's Popular Monthly; original poster designs.
- Frank, M. M., 506 Arch street, Philadelphia, Pa.: Publication—Textile Colorist.
- Fuller, E. Chubb, Indianapolis, Ind.: Publication—The Practical Dairyman.
- Funk & Wagnalls Company, 30 Lafayette Place, New York City: Standard Dictionary and other works. Chicago, 1893, medal.
- Gazette Publishing Company, Los Angeles, Cal.: Publication—Hotel Gazette and Outing News.
- Geological Publishing Company, Minneapolis, Minn.: Publication—American Geologist.
- Gibson, Joseph W., 757 Broadway, New York City: Publication—The Haberdasher.
- Golden Rule Company, The, Boston, Mass.: Publication—Christian Endeavor World.
- Goodman & Dickerson Company, 324 Dearborn street, Chicago: Publication—The Standard.
- Green, Monte L., Cincinnati, Ohio: Publication—Spokesman of the Carriage Trade.
- Griswold, Kate S., 227 Washington street, Boston, Mass.: Publication—Profitable Advertising and Art in Advertising.
- Guild & Lord, 620 Atlantic avenue, Boston, Mass.: Publication—Textile World.
- Haight, R. J., 334 Dearborn street, Chicago: Publication—The Monumental News.
- Halloran, J. E., 330 Market street, San Francisco, Cal.: Publication—Mining and Scientific Press.
- Harbison, Joseph L., 1113 Chestnut street, Philadelphia, Pa.: Publication—Table Talk.
- Harvey, Thomas F., 218 Lasalle street, Chicago: Publication—International Confectioner.
- Haynes, D. O., & Co., 396 Broadway, New York: Publications.
- Heimstreet, E. B., Janesville, Wis.: Publication—Wisconsin Druggists' Exchange.
- Holler, John, 31 Broad street, New York City: Publication—Dickerman's United States Treasury Counterfeit Detector.
- Holzappel, G., Cleona, Lebanon County, Pa.: Publications—The Pulpit, The Preacher's Helper.
- Home Science Publishing Company, The, 485 Tremont street, Boston, Mass.: Publication—American Kitchen Magazine.
- Hotel Red Book and Directory Company, Grand Union Hotel, New York: Publication—Directory.
- Housekeeper Corporation, The, 51 South Fourth street, Minneapolis, Minn.: Publication—The Housekeeper.
- Howe Addressing Company, 208 South Fourth street, Philadelphia, Pa.: Publications.
- Hubbard, Harland Page, 38 Times Building, New York: Publication—Hubbard's Newspaper and Bank Directory of the World.
- Hudson, Rev. Daniel E., Notre Dame, Ind.: Publication—The Ave Maria.
- Huebsch, D. A., & Co., 31 Rose street, New York: Publication—Huebsch's Yearbook.
- Hughes, William, 7134 Wentworth avenue, Chicago: Publication—The Engraver and Electrotyper.
- Hunter Publishing Company, Oakpark, Ill.: Publication—The Star.

- Idea Publishing Company, The, 61 Essex street, Boston, Mass.: Publication—Boston Ideas.
- Inland Printer Company, The, 214 Monroe street, Chicago: Publication—The Inland Printer.
- Inland Publishing Company, 315 Dearborn street, Chicago: Publication—The Inland Architect.
- International Board of Women's Christian Association, 217 West Ormsby avenue, Louisville, Ky.: Publication—International Messenger.
- International Monthly, The, Burlington, Vt.: Publication.
- Iron and Steel Publishing Company, 40 Dearborn street, Chicago: Publication—Iron and Steel.
- Jenkins, William R., 851 Sixth avenue, New York City: Publications.
- Johns Hopkins Press, Baltimore, Md.: Books and periodicals on science, mathematics, philology, history, and politics.
- Johnson, I. S., & Co., 22 Customhouse street, Boston, Mass.: Publication—Farm-Poultry.
- Journal of Commerce Company, Fullerton street, St. Louis, Mo.: Publications—The St. Louis Lumberman, The Age of Steel.
- Judge Company, 110 Fifth avenue, New York City: Publications—Judge Library, Leslie's Weekly.
- Judge, E. J., 38 South Holliday street, Baltimore, Md.: Publication—The Trade.
- Juvenile Literature Publishing Company, Hydepark, Mass.: Publication—The Favorite.
- Kansas Farmer Company, Topeka, Kans.: Publication—Kansas Farmer.
- Katlinsky, A. L., 5930 South Park avenue, Chicago: "Mizrakh," a picture cut out of cardboard.
- Kealing, H. T., 631 Pine street, Philadelphia, Pa.: Publication—African Methodist Episcopal Church Review.
- Kellogg, Warren P., 5 Park square, Boston, Mass.: Publication—New England Magazine.
- Keppler & Schwarzmann, New York City: Publication—Puck.
- Kilmer, H. E., Alliance, Ohio: Publication—Woman's Journal of Reformed Church.
- Kindergarten Literature Company, 203 Michigan avenue, Chicago: Publication—Kindergarten Magazine.
- Knauer, Erhard, 119 Fifth avenue, New York City: Publication—Manufactures of the United States.
- Knox, Frank H., Troy, N. Y.: Publication—City Government.
- Koenig, Adolph, M. D., 108 Ninth street, Pittsburg, Pa.: Publication—Pennsylvania Medical Journal.
- Langdon, Palmer H., 218 William street, New York City: Publication—The Aluminum World.
- Lasher & Osborne, Cincinnati, Ohio: Publication—Journal and Messenger.
- Latham Machinery Company, 197 South Canal street, Chicago: Monitor wire stitching and paging and numbering machines for books and pamphlets.
- Lea Bros. & Co., 706 Sansom street, Philadelphia, Pa.: Publication—American Journal of Medical Science.
- Leffingwell, Charles W., Chicago: Publication—The Living Church.
- Life Publishing Company, 19 West Thirty-first street, New York City: Publication—Life.
- Light of Truth Publishing Company, Columbus, Ohio: Publication—Light of Truth.
- Lippincott, J. B., Company, 720 Filbert street, Philadelphia, Pa.: Publications.
- Little, Brown & Co., 254 Washington street, Boston, Mass.: Books and illustrations.
- Living Age Company, The, 13½ Bromfield street, Boston, Mass.: Publication—The Living Age.

- Loeser's, Charles McK., Sons, 34 Beaver street, New York City: Publication—Bonfort's Wine and Spirit Circular.
- Lord & Thomas, Wabash and Randolph streets, Chicago: Publication—Directory of the American press.
- Lothrop Publishing Company, 530 Atlantic avenue, Boston, Mass.: Publications.
- Low, George P., 320 California street, San Francisco, Cal.: Publication—Journal of Electricity, Power and Gas.
- Lumber Trade Journal, 18 Broadway, New York: Publications.
- Lutheran Ministerium of New York, 12 State street, New York: Publication—Der Lutherische Herald.
- McCall, Irving G., & Dickson, J. A., 1526 Marquette Building, Chicago: Publication—Advertising Experience.
- McClure, The S. S. Company, 141 East Twenty-fifth street, New York: Publication—McClure's Magazine.
- McCormick & Gray, 67 Dearborn street, Chicago: Publication—The Interior.
- McCune, G. E., New Orleans, La.: Publication—The Morning Star.
- McGraw Publishing Company, 120 Liberty Street, New York: Publications—American Electrician and technical works.
- McKinley, William, Souvenir Committee, 1313 Walnut street, Philadelphia, Pa.—Naval and military history of the nation.
- Macmillan Company, The, 66 Fifth avenue, New York City: Publication—Science.
- Mallett, D. F., 89 Chambers street, New York City: Publication—Hardware Dealers' Magazine.
- Manufacturers' Record, Baltimore, Md.: Publications.
- Marine Record Publishing Company, Western Reserve Building, Cleveland, Ohio: Publication—The Marine Record.
- Marine Review Publishing Company, The, Cleveland, Ohio: Publication—Marine Review.
- Mason, Perry, & Co., Boston, Mass.: Publication—The Youth's Companion.
- Mason, Thomas, 414 East Pearl street, Cincinnati, Ohio: Publication—Western Tobacco Journal.
- Massachusetts Institute of Technology, Boston, Mass.: Publication—Technology Quarterly.
- Massachusetts New Church Union, 16 Arlington street, Boston, Mass.: Publication—The New Church Review.
- Mayers, Jacob, 21 Park Row, New York City: Publication—Butchers' Advocate.
- Meade, Nathaniel W., 430 Walnut street, Philadelphia, Pa.: Publication—Ladies' Home Magazine.
- Mensch, Paul, & Co., 92 LaSalle street, Chicago: Publication—Directory of Chicago Office Buildings, illustrated.
- Mercantile Adjuster Publishing Company, 150 Nassau street, New York: Publication—The Mercantile Adjuster.
- Merck & Co., 13 University place, New York: Publications—Merck's Report and Merck's Archives.
- Merriam, G. and C., Springfield, Mass.: Webster's International Dictionary of the English Language, and its abridgements.
- Meyer, C. F. G., 316 Clark avenue, St. Louis, Mo.: Publication—Meyer Brothers' Druggist.
- Meyer, Henry G., 100 William street, New York City: Publication—Engineering Record.
- Meyer, J. S., 57 Washington street, Chicago: Publication—Deaconess' Advocate.
- Michigan Artisan, Grand Rapids, Mich.: Pamphlet.
- Midland Publishing Company, St. Louis, Mo.: Publication—Farm Machinery.
- Miller, Mrs. L. K., Dayton, Ohio.: Publication—The Woman's Evangel.

- Miller Publishing Company, Minneapolis, Minn.: Publication—Northwestern Miller.
- Miner, E. N., 102 Fulton street, New York City: Publication—Typewriter and Phonographic World.
- Mitchell, John J., Company, 103 Fifth avenue, New York: Publication—Fashions for Tailors.
- Modern Miller Company, The, Third and Chestnut streets, St. Louis, Mo.: Publication—The Modern Miller.
- Montfort & Co., Cincinnati, Ohio: Publication—Herald and Presbyter.
- Morse, T. Vernet, Fine Arts Building, Chicago: Publications—Arts for America; Art Study Pictures.
- Mowry, F. J., Rome, N. Y.: Publication—Harness Gazette.
- Muller, L., jr., Manhattan Building, Chicago: Publication—The Architectural Studies.
- Mumford, A. W., 203 Michigan avenue, Chicago: Publication—Birds of All Nature.
- Municipal Engineering Company, Indianapolis, Ind.: Publication—Municipal Engineering.
- Munn & Co., 361 Broadway, New York City: Publications—Scientific American and its various editions.
- Murphy, James Shields, Boston, Mass.: Publication—The Golfer.
- National Iron and Steel Publishing Company, Pittsburg, Pa.: Publication—American Manufacturer and Iron World.
- National Printing Company, 509 South Twelfth street, Omaha, Nebr.: Publication—Hospodar.
- National Railway Publication Company, The, 24 Park place, New York City: Publication—Travelers' Official Railway Guide.
- New England Publishing Company, 3 Somerset street, Boston, Mass.: Publication—Journal of Education.
- New York Daily Times, Park Row, New York City: Processes showing United States methods of producing a daily newspaper.
- New York Lumber Trade Journal, The, New York City: Publications—The New York Lumber Trade Journal.
- New York Musical Courier Company, 19 Union Square, New York City: Publication—Musical Courier.
- Nolan Publishing Company, Drexel Building, Philadelphia, Pa.: Publication—The Implement Age.
- Ohmann-Dumesnil, A. H., St. Louis, Mo.: Publication—St. Louis Medical and Surgical Journal.
- Olszewski, Anton, 924 Thirty-third street, Chicago: Publication—Lietuva.
- Orange Judd Company, 52 Lafayette place, New York City: Publication—American Agriculturist.
- Ormsby, F. E., 358 Dearborn street, Chicago: Publication—Planets and People.
- Outing Publishing Company, The, 239 Fifth avenue, New York City: Publication—Outing.
- Outlook Company, The, 287 Fourth avenue, New York City: Publication—The Outlook.
- Overland Monthly Publishing Company, San Francisco, Cal.: Publication—Overland Monthly.
- Pacific Press Publishing Company, Oakland, Cal.: Publications—Pacific Health Journal, etc.
- Paine, Cassius M., Milwaukee, Wis.: Publication—Whist.
- Palmer, Mrs. Lucia A., Yonkers, N. Y.: Books—Grecian Days, Oriental Days.
- Parkinson & Kengla, 1121 Sutter street, San Francisco, Cal.: Publication—Occidental Medical Times.
- Partridge, A. E., Seattle, Wash.: Publication—Washington Odd Fellows.
- Pasadena Exhibition Association, Pasadena, Cal.: France in American Magazines.

- Pathfinder Publishing Company, Akron, Ohio: Publication—The Pathfinder.
- Pettingill & Co., Boston, Mass.: Publication—National Newspaper Directory and Gazette.
- Phelps Publishing Company, Springfield, Mass.: Publication—Farm and Home.
- Board of Trade, Philadelphia, Pa.: Publication.
- Philadelphia College of Pharmacy, 145 North Tenth street, Philadelphia, Pa.: Publication—American Journal of Pharmacy.
- Photographic Times Publishing Association, The, New York City: Publication—The Photographic Times.
- Piano Manufacturers' Association, 113 Fourteenth street, New York: American Musical Club Directory.
- Poet-Lore Company, 16 Ashburton place, Boston, Mass.: Publication—Poet-Lore.
- Popular Science, 108 Fulton street, New York: Publications.
- Porter, Taylor & Co., Chicago: Publication—The National Builder.
- Potter-Kendall Company, The, Boston, Mass.: Publication—The Nickel Magazine.
- Potter, W. W., Company, 91 Bedford avenue, Boston, Mass.: Publication—The National Magazine.
- Powell, Edwin C., Chatham, N. Y.: Publication—Fancier's Review and Fruit Grower.
- Price, Charles W., 41 Park Row, New York City: Publication—Electrical Review.
- Professional Photographer Publishing Company, 220 Washington street, Buffalo: Publications—Professional Photographer, and Process Review and Journal of Electrotyping.
- Progressive Age, The, 280 Broadway, New York: Publication.
- Publishers' Weekly, The, 59 Duane street, New York City: Periodicals and books of reference.
- Putnam, Eben, Danvers, Mass.: Publication—Putnam's Historical Magazine.
- Putnam, G. P.'s Sons, 29 West Twenty-third street, New York City: Publication—American Anthropologist.
- Railroad Gazette, The, 32 Park place, New York City: Publication—The Railroad Gazette.
- Railway Review, The, 1305 Manhattan Building, Chicago: Publication—Railway and Engineering Review.
- Rand, McNally & Co., Chicago: Publications—Bankers' Monthly and Directory. Educational text-books.
- Randall, T. A., & Co., Indianapolis, Ind.: Publication—The Clay Worker.
- Redding, W. E., 127 Duane street, New York City: Publication—Harness.
- Reinert Publishing Company, The, Denver, Colo.: Publication—Daily Mining Record.
- Reinnagel, G. H., 39 Cortlandt street, New York City: Publication—The Fireman's Herald.
- Retail Druggist, 37 Hodges Building, Detroit, Mich.: Publications.
- Review and Herald Publishing Company, Battle Creek, Mich.: Publications—Review and Herald, etc.
- Review of Reviews Company, The, 13 Astor place, New York City: Publication—Review of Reviews.
- Review Publishing and Printing Company, Walnut and Fourth streets, Philadelphia: Publication—American Exchange and Review.
- Rhodes, Bradford & Co., 78 William street, New York City: Publication—Bankers' Magazine.
- Rich, H. S., & Co., 177 La Salle street, Chicago: Publication—The Western Brewer.
- Ricketts, C. Lindsay, First National Bank Building, Chicago: Engrossed and illuminated addresses of congratulations, thanks, etc., in gold and colors.
- Ridenor & Jenks, Washington Post Building, Washington, D. C.: Publication—Army and Navy Register.

- Rodkinson, Michael L., 1332 Fifth avenue, New York City: Publication—New edition Babylonian Talmud.
- Rogers & Mason, Boston, Mass.: Publication—The Brickbuilder.
- Rollins, C. E., 161 La Salle street, Chicago: Publication—The Argus.
- Root, The A. I., Company, Medina, Ohio: Publication—Gleanings in Bee Culture.
- Rosback, Fred P., 60 South Canal street, Chicago: Wire-stitching machine for books and pamphlets.
- Rough Notes Company, The, Indianapolis, Ind.: Publication—Rough Notes.
- Rowell, George P., & Co., 10 Spruce street, New York City: Publication—Printers' Ink.
- Ryan, P. J., D. D., 211 South Sixth street, Philadelphia, Pa.: Publication—American Catholic Quarterly Review.
- Sanders, T. H., Publishing Company, 356 Dearborn street, Chicago: Publication—The Breeders' Gazette.
- Saunders, W. L., 26 Cortlandt street, New York City: Publication—Compressed Air.
- Seafert, William, 161 La Salle street, Chicago: Publication—Cement and Engineering News.
- Sheague, G. A., Cincinnati, Ohio: Publication—Express Gazette.
- Sherron, Charles B., Philadelphia, Pa.: Publication—Varnish.
- Shoe and Leather Reporter, New York City: Publications—Shoe and Leather Reporter; The Shoe Retailer.
- Shoe Trade Journal, 192 Fifth avenue, Chicago: Publication—Shoe Trade Journal.
- Short Story Publishing Company, 144 High street, Boston, Mass.: Publication—The Black Cat.
- Sibley Journal of Engineering, Ithaca, N. Y.: Publication—Sibley Journal of Engineering.
- Singer Manufacturing Company, The, 149 Broadway, New York: Machines for binding books and pamphlets.
- Small, Maynard & Company, 8 Beacon street, Boston, Mass.: Publications.
- Smalley, E. V., St. Paul, Minn.: Publication—Northwest Illustrated Monthly Magazine.
- Stager, Henry J., 938 Spring Garden street, Philadelphia, Pa.: Publication—Camp News.
- Starchroom Publishing Company, The, Cincinnati, Ohio: Publication—Starchroom Laundry Journal.
- Stern, Daniel, 69 Dearborn street, Chicago: Publication—American Artisan and Hardware Record.
- Stiggers, E. G., Washington, D. C.: Publication—Inventors' Age.
- Stone, Herbert S., & Co., Eldridge Court, Chicago: Publications.
- Street & Smith, 238 William street, New York City: Publication—Ainslee's Magazine.
- Street Railway Publishing Company, 120 Liberty street, New York City: Publications—Street Railway Journal; Street Railway Investments.
- Strong, Henry R., 514 Century Building, St. Louis, Mo.: Publication—National Druggist.
- Studer, Jacob H., 114 Fifth avenue, New York: Publication—Imperial quarto book.
- Swedish Methodist Episcopal Book Concern, 152 Oak street, Chicago: Publication—The Herald (Sandeбудet).
- Taltavall, John B., 253 Broadway, New York City: Publication—The Telegraph Age.
- Telephone Magazine, Marquette Building, Chicago: Publication.
- Terhune, W. L., 13 Columbia street, Boston, Mass.: Publication—Boot and Shoe Recorder.
- Textile Publishing Company, The, 78 Walker street, New York City: Publication—The Dry Goods Economist.

- Thirlkeld, Rev. L. A., 6 South Calvert street, Baltimore, Md.: Publication—Baltimore Methodist.
- Thompson Publishing Company, Chicago: Publications—The Confectioner and the Baker.
- Town Topics Publishing Company, 208 Fifth avenue, New York City: Publications—Town Topics, and Tales from Town Topics.
- Trade Journal, Richmond, Va.: Publication.
- Trades Weekly Company, The, 65 Nassau street, New York City: Publications—Jewelers' Weekly, and Clothiers' and Haberdashers' Weekly.
- Universal Peace Union, 219 Chestnut street, Philadelphia, Pa.: Publication—Peacemaker and Court Arbitration.
- United States Industrial Publishing Company, 31 State street, New York City: Publications.
- United States Trade Mark Association, The, 34 Nassau street, New York City: Trademarks, etc.
- University of Wisconsin, Madison, Wis.: Publication—The Wisconsin Engineer.
- Van Oost, John W., 23 Union Square, New York City: Publication—The Art Amateur.
- Vegetarian Company, The, 78 Madison street, Chicago: Publication—The Vegetarian Magazine.
- Voigt, Henry E., Hamburg, Wis.: Publication—Der Gefluegel Zuechter.
- Von Klenner, Madam K. Evans, 40 Stuyvesant street, New York City: Vocal musical pamphlets.
- Ware Brothers, 1118 Market street, Philadelphia, Pa.: Publications—Carriage Monthly, Export Carriage.
- Wasson, B. S., & Co., 91 and 93 South Jefferson street, Chicago: Publication—Roadmaster and Foreman.
- Watchman Publishing Company, The, Tremont Temple, Boston, Mass.: Publication—The Watchman.
- Webster, Alice, and Pratt, Candace R., 325 Dearborn street, Chicago: Publication—The Household Realm.
- Werner, Edgar S., Publishing and Supply Company, 48 East Nineteenth street, New York: Publication—Werner's Magazine.
- West, Miss Bina M., Port Huron, Mich.: Publication—The Ladies' Review.
- Whitaker, George F., 36 Bromfield street, Boston, Mass.: Publication—Zion's Herald.
- White City Art Company, The, 315 Dearborn street, Chicago: Publication—Great Pictures.
- White, Frank B., Company, Fisher Building, Chicago: Publication—Agricultural Advertising.
- White, James, & Co., 177 Monroe street, Chicago: Sample book of printing and art papers.
- Wild, Edwin O., St. Joseph, Mo.: Publication—Journal of Commerce.
- Wiley, John, & Son, New York: Publications upon mineralogy and minerals.
- Wilkins, William E., 66 West Broadway, New York City: Publication—Merchants' Review.
- Williams, Edwin, 295 Adams street, Brooklyn, N. Y.: Publication—Harmony Evolved as an Exact Science.
- Williams, Thomas A., Takoma Park, D. C.: Publication—Asa Gray Bulletin.
- Willy, John, 325 Dearborn street, Chicago: Publication—The Hotel Monthly.
- Wise, Leo, & Co., Fifth avenue and Race street, Cincinnati: Publications—American Israelite and Die Deborah.
- Wisser, John P., Fortress Monroe, Va.: Publication—Journal of the United States Artillery.

- Woman's Board Home Missions Presbyterian Church, 156 Fifth avenue, New York City: Publication—Home Mission Monthly.
- Woman's Board of Foreign Missions Reformed Church in America, 25 East Twenty-second street, New York City: Publication—The Mission Gleaner.
- Woman's Christian Association of Philadelphia, Eighteenth and Arch streets, Philadelphia, Pa.: Publication—Faith and Works.
- Woman's Medical Journal, The, 311 Superior street, Toledo, Ohio: Publication devoted to the science of medicine.
- Wonderly, Mrs. A., Lyons, Kans.: Publication—Weavers' Herald.
- Wood, Lovett M., Seattle, Wash.: Publication—The Trade Register.
- Wood, William, & Co., 51 Fifth avenue, New York: Publications—Medical Record and Journal of Obstetrics.
- Woodward, T. R., 300 Dearborn street, Chicago: The National Engineer.
- World's Maritime News Company, The, 63 William street, New York City: Publication—New York Maritime Register.
- Yale Medical School, New Haven, Conn.: Publication—Yale Medical Journal.
- Yates, C. L., Rochester, N. Y.: Publication—The National Nurseryman.
- Young Churchman Company, The, Milwaukee, Wis.: Publication—Our Young People.

CLASS 14.—*Maps and apparatus for geography and cosmography. Topography.*

- California Paris Exposition Commission, San Francisco, Cal.: Relief maps of Yosemite Valley, California, and State of California.
- Central School Supply House, Atlas Block, Chicago: Relief map of the United States.
- Department of the Navy, U. S. A., Bureau of Equipment, Washington, D. C.: Model or relief map of the West Indies and Caribbean Sea.
- Lord & Thomas, Trude Building, Chicago, Ill.: Maps and charts illustrating newspaper and publishing industry in the United States.

CLASS 15.—*Instruments of precision. Coins and medals.*

APPLIANCES, PROCESSES, AND PRODUCTS.

- American Arithmometer Company, 2102 Washington street, St. Louis, Mo.: Automatic adding and registering machines.
- American Numismatic and Archæological Society, The, 17 North Forty-third street, New York City: Coins and medals.
- American Optical Company, Southbridge, Mass.: Optical goods.
- Bay State Optical Company, Attleboro, Mass.: Optical goods and machines for making same.
- Brandt-Dent Company, The, Watertown, Wis.: Automatic cash register.
- Brashear, John A., Allegheny City, Pa.: Scientific instruments.
- Brown & Sharpe Manufacturing Company, Providence, R. I.: Standard gauges, micrometer and vernier calipers, rules, try-squares, straightedges, index and surface plates, etc.
- Bureau of the Mint, U. S. A., Washington, D. C.: United States coin money. Medals issued by United States. Lafayette coin dollars and dies.
- Chambers, Inskip & Co., 88-90 Wabash avenue, Chicago: Ophthalmometer.
- Department of the Navy, U. S. A., Washington, D. C.: Medals voted by Congress to United States naval officers. Seal of the Navy Department carved in wood.
- Des Jardins, B. M., Hartford, Conn.: Labor-saving computing instruments. Automatic computing scales for commercial purposes.
- Edison, Thomas A., Orange, N. J.: Phonographs.

- Ferracute Machine Company, Bridgeton, N. J.: Presses, dies, and other machinery for the manufacture of all kinds of metal coins, medals, badges, etc.
- Hastings, Charles S., New Haven, Conn.: Isochromatic object glasses.
- Hygienic Optical Company, 1147 Broadway, New York: Optical goods.
- International Arithmachine Company, Roanoke Building, Chicago: Calculating machine.
- King, Julius, Optical Company, New York: Optical goods.
- Le Maitre Optical Company, New York: Optical goods and machines for making same.
- Lubin, Siegmund, 21 South Eighth street, Philadelphia, Pa.: Eye-testing apparatus.
- Manhattan Optical Company, New York: Spectacles.
- Mills Novelty Company, 23 South Jefferson street, Chicago: Automatic coin-operating machines.
- National Cash Register Company, Dayton, Ohio: Cash registers, adding details or totals, printing checks, etc.
- Rowland, Henry A., Baltimore, Md.: Diffraction gratings.
- Scripture, Edward W., 109 Elm street, New Haven, Conn.: Color-sense tester for detection of color-blindness and color weakness.
- Simmons, John, Company, New York: Optical goods.
- Spencer Optical Company, New York: Optical goods.
- Warner & Swasey, Cleveland, Ohio: Astronomical instruments.

CLASS 16.—*Medicine and surgery.*

- American Hard Rubber Company, Akron, Ohio: Special rubber parts of apparatus for correcting deformities of human body.
- Banning Orthopedic and Mechanical Therapeutic Company, Fort Wayne, Ind.: Appliances for correcting deformities and malpositions of the internal organs of the human trunk.
- Beck, E. S., New York City: A formal generator, with automatic diaphragm pressure valve.
- Bloom, J. D., M. D., New Orleans, La.: Glass bowl for preserving vaseline in sterile form.
- Boldt, H. J., M. D., New York City: General operating table.
- Brand, A. F., Brooklyn, N. Y.: Aseptic wheel stretcher.
- Clark, A. C., & Co., Masonic Temple, Chicago: Cuspidors for dentists' chairs.
- Clark, J. C., M. D., New York City: Apparatus for the sterilization of catgut by cumol.
- Cleveland, Clement, M. D., New York City: Gynecological operating table.
- Crescent Steel Company, Pittsburg, Pa.: Special steel parts of apparatus for correcting deformities of human body.
- Dental College, Philadelphia, Pa.: Models and specimens of work.
- Dental department, University of California, San Francisco: Models and specimens of work.
- Dental department, University of Pennsylvania, Philadelphia, Pa.: Models and specimens of work.
- Dental department, Vanderbilt University, Nashville, Tenn.: Models and specimens of work.
- Dental department, Western Reserve University, Cleveland, Ohio: Models and specimens of work.
- Dental Surgery, College of, Chicago, Ill.: Models and specimens of work.
- Harvard Company, The, Canton, Ohio: Dental chairs, surgical chairs, and instrument cabinets.
- Invalid Chair Company, 701 Broadway, New York City: Invalid chairs.
- Jackson, Victor H., M. D., 240 Lenox avenue, New York: Orthodontia; models showing a system of correcting irregularities of the teeth and deformities of the jaws.

- Kelly, F. D., Peoria, Ill.: Prosthetic dentistry.
- Kelly, Howard, M. D., Baltimore, Md.: Endoscopic instruments for examining the rectum.
- Knopf, S. A., M. D., New York City: Pocket sputum flask for tuberculosis patients.
- Kny, Richard, New York City: Aseptic glass hospital washstands.
- Kny-Scheerer Company, The, 17 Park Row, New York City: Surgical operating theater-sterilizing laboratory, armarium chirurgicum, and sick-room supplies.
- Lagai, George, M. D., New York City: Apparatus and instruments. Preparations and specimens.
- Laplace, Ernest, Philadelphia, Pa.: Set of anesthesmosis forceps.
- Marks, A. A., 701 Broadway, New York City: Artificial limbs with rubber feet and hands. Surgical appliances, crutches, and invalid chairs; rubber hands and feet.
- Marks, George E., 701 Broadway, New York City: Knife and fork combined.
- Marks, William L., 701 Broadway, New York City: Clamp buckles for surgical appliances.
- Meyer, John H., 117 West Forty-eighth street, New York City: Improved artificial teeth of continuous gum.
- Meyer, Willy, M. D., New York City: Storage battery for galvano-caustic operations.
- Miller Rubber Manufacturing Company, Akron, Ohio: Specialties in rubber for physicians and surgeons.
- Munger, E. E., M. D., Spencer, Iowa: Invalid and fracture bed.
- National Institute of Dental Pedagogy of America: Collective exhibit representing six dental colleges of the United States, with models and dental work.
- New England Crutch Company, 701 Broadway, New York City: Crutches.
- Ritter Dental Manufacturing Company, The, Rochester, N. Y.: Dental chairs and electrical appliances.
- Rorick Air Cushion Truss Company, The, 1224 F street, NW., Washington, D. C.: Air cushions, trusses, and abdominal supports.
- Seabury & Johnson, 59-61 Maiden Lane, New York City: Medicinal and surgical plasters, surgical dressings and specialties.
- Sibley, Gideon, 1214 Filbert street, Philadelphia, Pa.: Dental instruments, appliances, and supplies. Dental chairs.

CLASS 17.—*Musical instruments.* "

MATERIALS, PROCESSES, AND PRODUCTS.

- Adek Manufacturing Company, 121 West Forty-second street, New York: Self-playing pianos and attachments.
- American Felt Company, The, Dolgeville, N. Y.: Felt for musical instruments.
- American Graphophone Company, Bridgeport, Conn.: Graphophones and supplies.
- American Steel and Wire Company, Worcester, Mass.: Piano and other musical-instrument steel wire.
- Art Joinery, The (Charles Dannenfelser), Cincinnati, Ohio: Workmanship in wood.
- Baldwin, D. H., & Co., Cincinnati, Ohio: Model of piano factory, showing inside and outside views, statistics, etc.
- Baldwin Piano Company, The, Cincinnati, Ohio: Concert grand pianos; grand and upright pianos. Parts used in piano construction; sections of cases; samples of woods.
- Barnhorn, Clement J., Cincinnati, Ohio: Design and carving of Baldwin upright piano.
- Bohmann, Joseph, Chicago, Ill.: Stringed and vibrating instruments.
- Brown & Patterson, Brooklyn, N. Y.: Piano plates.
- Burton, C. H., & Co. Cincinnati, Ohio: Veneers and cabinet woods used in construction of pianos and organs.
- Chicago Brass Company, Chicago: Reeds and reed boards for cabinet organs.

- Columbia Phonograph Company, 143 Broadway, New York: Complete series of graphophones, phonographs, records, etc.
- Comstock, Cheney & Co., Ivoryton, Conn: Upright piano action, keys, and keyboard.
- Consalvi, Icilio, 5 Garden Court, Boston, Mass.: Banjo consisting of 39,987 pieces.
- Elnzer & Anderson, Cincinnati, Ohio: Plans and specifications of Baldwin piano factory buildings.
- Flagg Manufacturing Co., 110 Lincoln street, Boston, Mass.: Zithers and harps.
- Fry, William H., Cincinnati, Ohio: Carving on Baldwin pianofortes.
- Guerin, P. E., New York City: Gilt and bronze ornaments for upright-piano cases.
- Hall, Thomas J., Cincinnati, Ohio: Joinery in construction of grand-piano cases.
- Hamilton Organ Company, The, Chicago, Ill: Reed organs and upright pianos.
- Kelly, The O. S., Company, Springfield, Ohio: Baldwin upright-piano plate casting.
- Kendall, Charles B., Boston, Mass.: Automatic banjos.
- Kerr, Clarence E., Cincinnati, Ohio: Workmanship in grand and upright piano sounding boards.
- Ludwig & Co., New York City: Pianos and self-playing attachments for same.
- Macy, John W., Cincinnati, Ohio: Scheme of construction for the Baldwin pianos.
- National Musical String Company, New York City: Strings for musical instruments.
- Mannello, Angelo, 680 Eagle avenue, New York City: Mandolins and guitars.
- Moran, Horace, New York City: Original design of case for upright piano.
- Piano and Organ Supply Company, Chicago: Keyboards for organs.
- Pratt, Reed & Co., Deep River, Conn.: Three sets of piano keys.
- Reindahl, Knute, 553 North Caroline street, Chicago: Violins.
- Shriver, T., & Co., New York City: Baldwin grand-piano plate casting.
- Sorenson, Andrew J., Chicago: Design for cabinet organ and scheme of construction for case work.
- Staib-Abendschein Company, The, New York City: Three actions for upright pianos and model.
- Strauch Brothers, New York City: Upright-pianoforte action and keys.
- Wickham, Chapman & Co., Springfield, Ohio: Iron plate for upright piano.

CLASS 18.—*Theatrical appliances and equipment.*

- Andrews, The A. H., Company, 300 Wabash avenue, Chicago: Opera chairs.
- Byron, Joseph, 1286 Broadway, New York: Flash-light photographic scenes in American theaters.
- Chicago Auditorium Association, Chicago, Ill.: Exterior and interior views of the Auditorium Opera House.

GROUP XIV.—CHEMICAL INDUSTRIES.

CLASS 87.—*Chemical and pharmaceutical arts.*

EQUIPMENT, PROCESSES, AND PRODUCTS.

- American Supply Company, New York City: Putz cream (metal polish).
- Arable Cement Company, New York: Tableting cement used by printers and bookbinders.
- Armour & Co., Chicago: Inedible animal products, bone and its products, etc.
- Armour Packing Company, Kansas City, Mo.: Inedible animal products, horns; hoofs, bones, fertilizers.
- Atlantic Refining Company, Philadelphia, Pa.: Petroleum and products.
- Babbitt, B. T., 82 Washington street, New York: Soaps, glycerines, potash, and by-products.
- Battle & Co., St. Louis, Mo.: Bromidia and ecthol.
- Bean-Chamberlain Manufacturing Company, Hudson, Mich.: Bean whitewashing and coating machine.

- Binney & Smith, 257 Pearl street, New York: Carbon gas blacks, lamp or oil blacks, "Peerless" black.
- Blichert, The P. A., Manufacturing Company, 57 Illinois street, Chicago: Shoe polishes.
- A. R. Bremer & Co., 21 Lasalle street, Chicago: Coke Dandruff Cure.
- Burbank Engraving Company, 55 Olive street, Boston, Mass.: Embossing composition.
- Cuprigraph Company, The, 108 North Green street, Chicago: The sanitary still, producing pure aerated distilled water.
- Drevet Manufacturing Company, The, 59 Prince street, New York: Charles Marchand's medicinal preparation.
- Fiske Brothers Refining Company, New York: Lubricating oils for steam engines and all kinds of machinery.
- Foederer, Robert H., Philadelphia, Pa.: Shoe dressings.
- Freck, The Wm., Company, 120 South Clinton street, Chicago: Pharmaceutical and chemical machinery and devices.
- Genesee, D., Baltimore, Md.: Pharmaceutical machinery.
- Jandus, William, 37 Tilden avenue, Cleveland, Ohio: Water filters.
- Kutnow, S., & Bro., New York City: Effervescent Carlsbad salts.
- Lambert Pharmacal Company, 2101 Locust street, St. Louis, Mo.: Listerine.
- Lawrence, W. W., & Co., Pittsburg, Pa.: Paints and machinery.
- Leonard & Ellis, 11 Broadway, New York: Machinery oils.
- Matheson, William J., & Co., Limited, 182-184 Front street, New York: White lead.
- Michigan Carbon Works, Detroit, Mich.: Gelatines and glues.
- Muralo Company, The, New Brighton, N. Y.: Decorative materials.
- Muzzy Brothers, Paterson, N. J.: Aquarine cold-water paints. Weatherproof and fireproof.
- Roberts & Co., St. Louis, Mo.: Antikamnia.
- Russia Cement Company, Gloucester, Mass.: Fish glues. Le Page's liquid glue for general use, and Le Page's photo-engraving glue.
- Seabury & Johnson, 59-61 Maiden lane, New York: Medicinal and surgical plasters, surgical dressings, specialties.
- Sen-Sen Company, Rochester, N. Y.: Cachou Sen-Sen and chewing gum.
- Solar Refining Company, Lima, Ohio: Petroleum and by-products.
- Standard Oil Company, 26 Broadway, New York: Petroleum and by-products.
- Swift & Co., Chicago: Inedible animal products.
- Thomsen Chemical Company, Baltimore, Md.: General chemicals.
- Tripler Liquid Air Company, 121 West Eighty-ninth street, New York: System for liquefying air—processes and products.
- Universal Silver Polish Company, Denver, Colo.: Metal polish.
- Valentine & Co., 57 Broadway, New York: Coach and car varnishes and colors. Pure colors in oil. Artists' oil colors in tubes. Enamels.
- Warner, William R., & Co., Philadelphia, Pa.: Pills and pharmaceutical products

CLASS 88.—*Manufacture of paper.*

RAW MATERIALS, EQUIPMENTS, PROCESSES, AND PRODUCTS.

Crane Brothers, Westfield, Mass.: Linen ledger and record papers.

CLASS 89.—*Leather and skins.*

RAW MATERIALS, EQUIPMENT, PROCESSES, AND PRODUCTS.

- Blatz, F. J., & Bros., Elizabeth, N. J.: Glazed kid from goat, calf, and sheep.
- Dungan, Hood & Co., Incorporated, Philadelphia, Pa.: Glazed kids.
- Foederer, Robert H., Philadelphia, Pa.: Tanned leather from goat and calf skins. Glazed kid of chrome tannage, known as vici kid.

- Green, Calvin, & Son, Saltillo, Tex., and Lewiston, Pa.: North American and Saltillo (Tex.) oak sole leather. Texas oak sole, cropped sides and bends.
- Hollinger, Amos, Lancaster, Pa.: Finished oak harness leather in backs.
- Leas & McVitty, 307 North Third street, Philadelphia, Pa.: Oak leather and cut soles. Oak belting butts, backs, and bends.
- Salem Tanning Company, Salem, Va.: Chestnut oak-bark leather, in rough and prepared for use.
- Scherer, Oscar, & Bro., 29 Spruce street, New York; Glazed fancy colors and black chrome kids.
- Slocumb, F. F., & Co., Wilmington, Del.: Leather staking machine. Leather stamping machine.
- Vacuum Oil Company, Rochester, N. Y.: Leather oils and greases.
- Vaughn Machine Company, Boston, Mass.: Leather staking machine.
- Wagner Leather Company (California Commission), Stockton, Cal.; Finished hides; pelts, and skins.
- Woodside Patent Calf Manufacturing Company, The, Newark, N. J.: Patent calf leather.

CLASS 90.—*Perfumery.*

RAW MATERIALS, EQUIPMENT, PROCESSES, AND PRODUCTS.

- Bremer, A. R., Company, 21 La Salle street, Chicago: Coke dandruff cure.
- Colgate & Co., 55 John street, New York: Perfumery, toilet soaps, and accessories.
- Cream of Lemon Company (California Commission), Los Angeles, Cal.: Cream of lemon.
- Hotchkiss, The H. & G., International Prize Medal Essential Oil Company, Lyons, N. Y.: American essential oils.
- Kochs, Theo. A., Company, 158 Wells street, Chicago: Barbers' chairs.
- Reiger, Paul, & Co. (California Commission), San Francisco, Cal.: Flavoring extracts and perfumes.
- Sen-Sen Company, Rochester, N. Y.: Cachou Sen-Sen and chewing gum.
- Webb, Mrs. L. T. (California Commission), Los Angeles, Cal.: Toilet soaps.
- Williams, The J. B., Company, Glastonbury, Conn.: Shaving and toilet soaps.

CLASS 91.—*Tobacco and matches.*

EQUIPMENT, PROCESSES, AND PRODUCTS.

- Baltimore Leaf Tobacco Association, Baltimore, Md.: Leaf tobacco.
- Bimberg, Joseph, Elmira, N. Y.: Leaf tobacco.
- Blumenstiel, Levi & Co., New York: Porto Rican tobacco.
- Brown, Morris, 335 Broadway, New York: Patented cigar box.
- Cincinnati Leaf Tobacco Warehouse Company, Cincinnati, Ohio: Tobacco, "White Burley," for pipe smoking.
- Clark, M. H., & Bros., Clarksville, Tenn.: Tobaccos.
- Clay, Henry, & Bock & Co., Limited, 32 Broadway, New York City: Clear Havana cigars.
- Cullman Brothers, New York: Tobaccos grown in Ohio—Zimmer, Spanish, and Little Dutch; wrappers, binders, and fillers grown in Wisconsin and Pennsylvania.
- Cunningham, Col. John S., Cunningham, N. C.: Tobaccos grown in North Carolina—bright, mahogany, and dark.
- Cytron, Otto, 202 North Main street, Los Angeles, Cal.: Manufactured tobacco; cigar novelties.
- Department of Agriculture, U. S. A., Division of Soils, Washington, D. C.: Collective exhibit of leaf tobacco grown in the United States.
- Dibrell Brothers, Danville, Va.: Bright, mahogany, and dark Virginia leaf tobacco.
- Florida Havana Company, Quincy, Fla.: Tobacco, Cuban and Sumatra seed, grown in Florida.

- Hagan-Dart Tobacco Company, Richmond, Va.: Dark export types of Virginia leaf tobacco.
- Havana Commercial Company, 32 Broadway, New York: Cigars.
- Hoge, Irwin & Co., Winston, N. C.: Tobacco, bright and mahogany, for export.
- Jordan, J. F., Greensboro, N. C.: Tobacco, leaf, bright and mahogany, grown in North Carolina.
- Littman, Felix, Quincy, Fla.: Sumatra and Cuban tobaccos.
- Louisville Leaf Tobacco Exchange, Louisville, Ky.: "White Burley" and dark tobacco grown in Kentucky.
- Manhattan Brass Company, New York: Brass castings and railings for tobacco manufacturing machinery.
- Miller, Du Brul & Peters Manufacturing Company, The, 511 East Pearl street, Cincinnati, Ohio: Machinery for manufacturing cigars and cigarettes; cigarmakers' molds and tools.
- Morris, E. K., & Co., Cincinnati, Ohio: Bar iron and steel for tobacco manufacturing machinery.
- Morris, J. B., Foundry Company, Cincinnati, Ohio: Iron castings for tobacco manufacturing machinery.
- Owl Commercial Company, Quincy, Fla.: Tobacco grown in Gadsden County, Fla.
- Spiller & Robinson, Ada, Tex.: Cuban seed tobacco grown in Texas.
- Strauss, L. L., Richmond, Va.: Bright and dark types of Virginia tobacco.
- Surburg Company, The, New York: Manufactured tobaccos.
- Sutter Brothers, 174-176 Pearl street, New York City: Cigar wrapper, binder, and filler grades of tobaccos grown in Wisconsin, Ohio, Connecticut, and Pennsylvania.
- Texas Tobacco Growers' Association, Houston, Tex.: Texas tobaccos.
- United States Tobacco Company, Richmond, Va.: Leaf, plug, and fine-cut tobacco in process of manufacture.
- Veitor, E. K., & Co., Richmond, Va.: Light, mahogany, and dark tobaccos grown in Virginia.
- Wilkins, W. A., Winston, N. C.: Bright tobacco grown in North Carolina.
- Williamson, T. S., & Co., Danville, Va.: Bright, mahogany, and dark Virginia leaf tobacco.

Following is a list of the members of the thirteen international juries in Group III, classes 11 to 18, inclusive, and Group XIV, classes 87 to 91, inclusive:

GROUP III.—APPLIANCES AND GENERAL PROCESSES RELATING TO LITERATURE, SCIENCE, AND ART.

CLASS 11.—*Typography.*

Chamerot, Georges, president, France.	Weill, Nathan, France.
Büxenstein, vice-president, Germany.	Wittman, Charles, France.
Lahure, Alexis, recorder, France.	Fritz, ———, Austria.
Duruy, Edouard, secretary, France.	Weissenbruch, Paul, Belgium.
Buttner-Thierry, Frédéric-Edmond, France.	Jones, John Fred, Denmark.
Chaix, Alban, France.	Johnson, Claude M., United States.
Champanois, Fernand, France.	Veit, Sidney B., United States.
Delalain, Paul, France.	Walker, Emery, Great Britain.
Keüfer, Auguste, France.	Wildik, Vicomte de, Portugal.
Michaud, Jules, France.	Frank, Gustave, Russia.
Moullot, Ferdinand, France.	
Tuleu, Charles, France.	
Manzi, Michel, France.	
Stern, René, France.	

EXPERTS.

Courtier, France.
 Madherny, Russia.
 Vigreux, France.
 Capehart, United States.

CLASS 12.—*Photography.*

Davanne, Alphonse, president, France.
 Eder, vice-president, Austria.
 Vidal, Léon, recorder, France.
 Pricam, E., secretary, Switzerland.
 Braun, Gaston, France.
 Bucquet, Maurice, France.
 Demaria, Jules-Joseph, France.
 Fleury-Hermagis, Jules, France.
 Marey, Dr. Jules-Etienne, France.
 Nadar fils, Paul, France.
 Provost, Antoine, France.
 Wallon, Etienne, France.
 Bourgeois, Paul, France.
 Boyer, Paul, France.
 Geisler, Louis, France.
 Miethe, Dr., Germany.

Cameron, Edgar, United States.
 Cecil, E. Hertslet, Great Britain.
 Leonino, Baron David, Italy.
 Kawamura, Junzo, Japan.
 Lanier-Van Monckhoven, A., de, Belgium.
 Dubouloz, Ecuador.
 Engelsted, C., Denmark.
 Poulat, Julio, Mexico.
 Desmazière, comte, Greece.

EXPERTS.

Berthaud, Michel.
 Carpentier, J.
 Gilles, E.

CLASS 13.—*Books, musical publications, bookbinding (equipments and products), newspapers, posters.*

Belin, Henri, president, France.
 Zech-Dubiez, vice-president, Belgium.
 Mainguet, Pierre, recorder, France.
 Masson, Pierre, secretary, France.
 Berr, Emile, France.
 Chéret, Jules, France.
 Durand, Auguste, France.
 Fasquelle, Eugène, France.
 Flammarion, Ernest, France.
 Fouret, René, France.
 Gounouilhou, H., France.
 Gruel, Léon, France.
 Hetzel, Jules, France.
 Heugel, Henri, France.
 Barre, Charles, France.
 Goubaud, Abel, France.
 Layus, Lucien, France.
 Le Soudier, Henri, France.
 Ollendorf, Paul, France.

Spemann, Germany.
 Rosell, C. A. O., United States.
 Barclay, Dr. Thomas, Great Britain.
 Zeggio, Victor, Italy.
 Boele Van Hensbroek, P. A. M., Netherlands.
 Bengesco, Georges, Roumania.
 Pilar von Pilhau, Baron, Russia.
 Bürger, H. J., Switzerland.
 Fischer, Dr., Germany.
 Engel, Em. M., Austria.
 Gero, Louis, Hungary.
 Kœchlin, Raymond, Japan.
 Olano y Ville, A., Peru.
 De Portugal de Faria, Antonio, Portugal.
 Ricordi, ———, Italy.

EXPERT.

Pichon.

CLASS 14.—*Maps and apparatus for geography and cosmography.*

Bouquet de la Grye, Jean Jacques Anatole, president, France.
 Held, Major, vice-president, Switzerland.
 Héraud, Gabriel, recorder, France.
 Guy, Camille, secretary, France.
 Berthaut, Col. Henri, France.
 Bonaparte, Prince Roland, France.

Delagrave, Charles, France.
 Lallemand, Charles, France.
 Gauthiot, Charles, France.
 Wendt, Germany.
 Schrader, Andorra.
 Valdes, Rodrigo, Mexico.
 Rikatcheff, Russia.

CLASS 15.—*Instruments of precision, coins, and medals.*

Laussedat, Col. Aimé, president, France.
 Westphal, vice-president, Germany.
 Pellat, Henri, recorder, France.
 Sudre, Pierre-Louis, secretary, France.
 Baille-Lemaire, Jean-Baptiste, France.
 Delestre, Maurice, France,
 De Foville, Alfred, France.
 Nachet, Alfred, France.
 Peigné, Gen. Paul, France.
 Briat, Edmond, France.

De Gramont, Arnaud, France.
 Mazerolle, Fernand, France.
 Ottolini, France.
 Reichert, Ch., Austria.
 Rees, John K., United States.
 Vernon-Boys, C., Great Britain.
 Dufour, H., Switzerland.
 Hoag, W. R., United States.
 Lindeck, Dr., Germany.

CLASS 16.—*Medicine and surgery.*

Pinard, Dr. Adolphe, president, France.
 Christmas Dirckinck-Holmfeld, Dr. de,
 vice-president. Denmark.
 Tuffler, Dr. Théodore, recorder, France.
 Leclerc, Théophile, secretary, France.
 Berger, Dr. Paul, France.
 Galippe, Dr. Victor, France.
 Hartmann, Dr. Henri, France.

Labadie-Lagrave, Dr. Frédéric, France.
 Le Dentu, Dr. Auguste, France.
 Nocard, Edmond, France.
 Pozzi, Dr. Samuel, France.
 Bazy, Dr. Pierre, France.
 Eschbaum, Germany.
 Beard, Charles H., United States.
 Reverdin, Dr. Auguste, Switzerland.

CLASS 17.—*Musical instruments.*

Lyon, Gustave, president, France.
 Ehrbar, jr., Fred, vice-president, Austria.
 Couesnon, Amédée, recorder, France.
 Acoulon, Alfred, secretary, France.
 Bernardel, Gustave, France.
 Bricqueville, Eugène de, France.
 Dutreih, Georges, France.
 Gaveau, Gabriel, France.
 Pierre, Constant, France.
 Schœnaers, Henri, France.
 Bord, Antoine dit Antonin, France.
 Focké, Ernest, France.

Jacquot, Albert, France.
 Thibout, Amédée, France.
 Rœnisch, Germany.
 Krehbiel, Henri, United States.
 Schunda, J. W., Hungary.
 Dloussky, Erasme, Russia.
 Mermod, L. P., Switzerland.
 Danti, Louis, Italy.
 Lacerda, Francisco, Portugal.

EXPERT.

Carpentier.

CLASS 18.—*Theatrical appliances and equipment.*

Gailhard, Pierre, president, France.
 Adams, Milward, vice-president, United
 States.
 Reynaud, Charles, recorder, France.
 Baillet, Georges, secretary, France.

Carré, Albert, France.
 Carpezat, Eugène, France.
 Gros, J. M., France.
 Gutperle, Richard, France.

GROUP XIV.—CHEMICAL INDUSTRIES.

CLASS 87.—*Chemical and pharmaceutical arts.*

Troost, Louis, president, France.
 Mendeleeff, vice-president, Russia.
 Haller, Albin, recorder, France.
 Lefebvre, Georges, secretary, France.
 Adrian, Louis, France.

Astier, Député, France.
 Baron fils, Emile, France.
 Boude, Frédéric, France.
 Debuchy, Emile, France.
 Dubois, François, France.

CLASS 87.—*Chemical and pharmaceutical arts*—Continued.

Expert Bezançon, France.
 Lauth, Charles, France.
 Lesieur, Georges, France.
 Lorilleux, Charles, France.
 Marquet de Vasselot, France.
 Riche, Alfred, France.
 Suilliot, Hippolyte, France.
 Arnayon, Louis, France.
 Asselin, Eugène, France.
 Champigny, Armand, France.
 Dufraisie, Gustave, France.
 Freund-Deschamps, France.
 Hartog, Georges, France.
 Paupelin, Léonce, France.
 Witt, Dr. O. N., Germany.
 Bauer, Austria.
 Koch, Julien, Belgium.

José Fitter, Spain.
 W. B. Rising, United States.
 Meldola, F. R. S., Professor, Great Britain.
 De Wagner, Eug., Hungary.
 Rio de la Loza, Francisco, Mexico.
 H. Yssel de Schepper, Dr., Netherlands.
 Harth, Jorje, Peru.
 Brunk, Germany.
 Hogg, Douglas, Dr., Great Britain.
 Salimbeni, Jules, Italy.
 Fris, Gosta, Sweden.
 Dreyfus, Léon, Salvador.

EXPERTS.

Debuchy, Emile.
 Halphen, Georges.

CLASS 88.—*Manufacture of paper.*

Laroche-Joubert, Edgard, president, France.
 Bennetti, vice-president, Italy.
 Blanchet, Augustin, recorder, France.
 Montgolfier, Etienne de, secretary, France.
 Choquet, Edouard, France.
 Codet, Pierre, France.
 Debouchaud, Alexandre, France.
 Faillot, Auguste, France.
 Lhomme, Charles, France.

Pauilhac, Georges, France.
 Pallez, Auguste, France.
 Haas, Germany.
 Kink, I. de, Austria.
 Vylder, Edm. de, Belgium.
 Benetti, Jacques, Italy.
 Ishikawa, Iwaho, Japan.
 Bulow, Wilhelm, Norway.
 Smidt van Gelder, P., Netherlands.
 Restzoff, Nicolas, Russia.
 Folin, V., Sweden.

CLASS 89.—*Leather and skins.*

Poullain, Charles, president, France.
 Suess, jr., Fr., vice-president, Austria.
 Peltreau, Placide, recorder, France.
 Jossier, Gabriel, secretary, France.
 Desselas, Andre, France.
 Goguenheim, Emile, France.
 Krempf, Guillaume, France.
 Mirabel-Chambaud, Marius, France.
 Perrin, Antonin, France.
 Petitpont, Gustave, France.
 Pinault, Eugène, France.
 Solanet, Gustave, France.
 Combe, Alphonse, France.
 Corbeau, France.
 Fortier-Beaulieu, Edouard, France.
 Raymond, François, France.

Villette-Gaté, France.
 Stamatiades, Greece.
 Timmermans, J. B., Netherlands.
 Floresco, Théodore, Roumania.
 Bouvy, A., Belgium.
 Legallet, A., United States.
 Popper, Etienne, Hungary.
 Serralunga, Italy.
 Chabert, Alfredo, Mexico.
 Sokownine, Russia.

EXPERTS.

Floquet, Clovis.
 Gentils, Armand.
 Huillard.

CLASS 90.—*Perfumery.*

Prot, Paul, president, France.
 Leichner, Joh. L., vice-president, Germany.
 Piver, Lucien, recorder, France.
 Darrasse, André, secretary, France.
 Bagot, Aristide, France.
 Brach, France.
 Gallet, Edmond, France.

Klotz, Victor, France.
 Ferrand, Antoine, France.
 Semezie, Jules, France.
 Yancouloff, Dr. J., Bulgaria.
 Roussanoff, Russia.
 Lorenz, George R., United States.
 Laurier, John, Great Britain.

CLASS 91.—*Tobacco and matches.*

Brunet, Jules, president, France.
 Tedeschi, Léonce, vice-president, Servia.
 Bardot, Louis, recorder, France.
 Alvarez, F. de P., secretary, United States.
 Broca, France.
 Laurent, François, France.
 Melia, Michel, France.
 Sevène, Henri, France.

Zaphiroff, Z. F., Bulgaria.
 Floyd, N. L., United States.
 Clado, Marino, Greece.
 Florés, Manuel, Mexico.
 Lagerman, Alex., Sweden.
 L'Espagnol de la Trameyrie, Paul, Ecuador.
 Giustiniani, Hercule, Italy.

Exhibitors and collaborators receiving awards in Groups III and XIV, and the grade thereof.

GROUP III, CLASS 11.

Name of exhibitor.	Exhibit.	Grade of award.
Addressograph Co	Addressing machines.....	Silver medal.
American Postal Machine Co.....	Canceling machines.....	Do.
† American Society of National Advertisers.	Calendars, etc.....	Gold medal.
American 3 Color Co.....	Prints	Bronze medal.
* American Type Founders' Co	Type founders' supplies	Grand prize.
American Writing Machine Co	Typewriters	Silver medal.
Babcock Printing Press Manufacturing Co.	Printing press	Gold medal.
* Barnhart Bros. & Spindler, Great Western Type Foundry.	Type founders' supplies	Grand prize.
Barr-Fyke Canceling Machine Co.....	Canceling machines.....	Silver medal.
Barrie, Geo., & Son	Engravings, etc	Gold medal.
Barry Postal Supply Co	Canceling machine.....	Silver medal.
Blickensderfer Manufacturing Co	Typewriters, etc.....	Do.
Bowen, Wm. M. P	Carbon holder.....	Honorable mention.
Bureau of Engraving and Printing	United States money, etc.....	Grand prize.
Campbell Printing Press and Manufacturing Co.	Printing press	Gold medal.
* Chandler & Price Co	Printing presses, etc.....	Grand prize.
Chicago Colortype Co.....	Three-color process.....	Silver medal.
Chicago Writing Machine Co	Typewriters	Gold medal.
Columbia Typewriter Manufacturing Co.	do	Silver medal.
Cottrell, C. B., & Sons Co	Printing press	Gold medal.
Densmore Typewriter Co	Typewriters	Silver medal.
Des Jardins, B. M.	Attachment to typewriters.....	Honorable mention.
Des Jardins Type Justifier Co.....	Type justifiers.....	Silver medal.
Dick Co., A. B.	Edison mimeograph.....	Do.
Doremus Canceling Machine Co.....	Canceling machine.....	Do.
Duncan, J. S.	Graphotype machine.....	Do.
Durant, W. N.	Counting machines, etc.....	Bronze medal.
Frank Leslie Publishing House.....	Art sketches, etc.....	Silver medal.
Franklin Typewriter Co	Typewriters	Bronze medal.
Gerry & Murry	Reproductions of letters.....	Do.
Goss Printing Press Co.....	Printing press	Gold medal.
* Hamilton Manufacturing Co.....	Printing-house supplies	Grand prize.

† The product of these exhibitors (see page 40) formed the exhibition of the Model American Printing Establishment, and under the rule of the Exposition each exhibitor is entitled to a diploma of grand prize.

* Twenty-nine representative United States manufacturers contributed to this exhibit, and under the rule of the Exposition each exhibitor is entitled to the diploma of gold medal.

Exhibitors and collaborators receiving awards in Groups III and XIV, and the grade thereof—Continued.

GROUP III, CLASS 11—Continued.

Name of exhibitor.	Exhibit.	Grade of award.
Hammond Typewriter Co.....	Typewriters	Silver medal.
Harris Automatic Press Co.....	Printing presses	Do.
Heinicke-Fiegl Lithograph Co.....	Commercial lithography	Do.
*Hempel & Dingens	Printers' quoins	Grand prize.
Imperial Manufacturing Co.....	Stencil-cutting machine.....	Silver medal.
*Inland Printer Co.....	Specimens of printing.....	Grand prize.
Jewett Typewriter Co.....	Typewriters	Gold medal.
Lambert Typewriter Co.....	.....do.....	Bronze medal.
Lanston Monotype Machine Co.....	Type-casting machines, etc.....	Gold medal.
Levy, Louis Edward	Chemical engraving	Do.
Mergenthaler Linotype Co.....	Machines for composition of type.....	Grand prize.
Meyercood Co.....	Decalcomania transfer ornaments.....	Bronze medal.
Miehle Printing Press and Manufac- turing Co.....	Printing press	Gold medal.
Miehle, Robert.....	Improvement to printing press.....	Silver medal.
Mitchell, John J., Co.....	Printing of fashion plates	Do.
Mittag & Volger.....	Typewriter supplies.....	Bronze medal.
Morgan, W. J., & Co.....	Lithographs	Gold medal.
National Association of Photo-Engrav- ers.....	Reproduction processes.....	Do.
*National Machine Co.....	Printing press	Grand prize.
*Neostyle Manufacturing Co.....	Duplicating machines.....	Do.
Oliver Typewriter Co.....	Typewriters	Gold medal.
Osgood Art Colortype Co.....	Color printing.....	Bronze medal.
Pittsburg Writing Machine Co.....	Typewriters	Silver medal.
Quigley Furniture Co.....	Adjustable tables.....	Bronze medal.
Remington-Sholes Co.....	Typewriters	Silver medal.
*Rouse, Harry B.....	Rule cutters, etc.....	Grand prize.
Slade & Hicks.....	Lithography	Silver medal.
Smith Premier Typewriter Co.....	Typewriters	Grand prize.
Smith, R. H., Manufacturing Co.....	Markers, stamps, etc.....	Bronze medal.
Tenney, J. F., Co.....	Rubber type, etc.....	Do.
Tiffany & Co.....	Copper and steel plate and intaglio printing.....	Gold medal.
Underwood, John, & Co.....	Typewriter supplies.....	Do.
United States Department of Liberal Arts.....	Publishers' Building and contents	Grand prize.
United States Government Printing Office.....	Typography, etc.....	Gold medal.
*Unitype Co., The.....	Typesetting machine.....	Grand prize.
Verbeck, Geo. J.....	Bank-note engraving.....	Gold medal.
Wagner Typewriter Co.....	Typewriters	Do.
*Wesel, F., Manufacturing Co.....	Brace galleys.....	Grand prize.
Western Bank Note and Engraving Co.....	Steel plate engraving, etc.....	Gold medal.
*Wetter, Joseph, & Co.....	Numbering machines.....	Grand prize.
Williams Typewriter Co.....	Typewriters	Silver medal.
Wyckoff, Seamans & Benedict.....	.....do.....	Grand prize.
Yesbera Manufacturing Co.....	Adjustable tables.....	Bronze medal.
Yost Writing Machine Co.....	Typewriters	Gold medal.

GROUP III, CLASS 12.

American Aristotype Co.....	Photographic prints.....	Silver medal.
American 3 Color Co.....	Catalogues, etc.....	Do.
Baker Art Gallery.....	Genre photographs.....	Gold medal.
Bausch & Lomb Optical Co.....	Photographic supplies.....	Do.
Bolles, C. E.....	Marine photographs.....	Do.
Brenner, W. N.....	Portrait photography.....	Silver medal.
Burton Photography Co.....	Yachting photographs.....	Do.
Byron, Joseph.....	Flash-light photographs.....	Do.
Chicago Colortype Co.....	Three-color process	Gold medal.
Corne, W. F.....	Photograph	Honorable mention.
Curtis & Cameron.....	Copley prints.....	Gold medal.
Dodge, Chas. Richards.....	Kodak photography.....	Honorable mention.
Eastman Kodak Co.....	Kodaks, etc.....	Grand prize.
Johnston, Fannie B.....	Portrait photography.....	Gold medal.
Lawrence, Geo. R.....	Photographs by artificial light.....	Silver medal.
Levy, Max.....	Proofs from engravings.....	Gold medal.
Nepera Chemical Co.....	Photographic prints.....	Silver medal.
Osgood Art Colortype Co.....	Color printing.....	Bronze medal.
Photo-Materials Co.....	Photographs.....	Do.
Popular Photograph Co.....	Photography apparatus.....	Honorable mention.
Rinehart, F. A.....	Photographs of American Indians.....	Silver medal.
Schumacher, F. G.....	Photographs	Do.
Steckel, Geo.....	Studio photography.....	Do.
Tabor Photographic Co.....	Photographs and prints.....	Do.
White Co., The H. C.....	Stereoscopes and views	Bronze medals.

*The product of these exhibitors (see page 39) formed the exhibition of the Model American Printing Establishment, and under the rule of the Exposition each exhibitor is entitled to a diploma of grand prize.

Exhibitors and collaborators receiving awards in Groups III and XIV, and the grade thereof—Continued.

GROUP III, CLASS 13.

Name of exhibitor.	Exhibit.	Grade of award.
Armour & Co	Poster calendar	Bronze medal.
Barnes, A. S., & Co.	Publication	Do.
Barrie, Geo., & Son.	Publications, etc	Grand prize.
Benjamin, W. E.	Publications	Bronze medal.
Carl, William C.	Pamphlets	Honorable mention.
Century Co.	Original drawings, etc.	Grand prize.
Chandler & Price Co.	Paper cutter	Bronze medal.
*Collective exhibit	United States newspapers, periodicals, and class journals.	Grand prize.
Estes, Dana & Co.	Books, etc	Silver medal.
Frank Leslie Publishing House.	Publication	Bronze medal.
Funk & Wagnalls Co	Standard Dictionary, etc	Gold medal.
Jenkins, Wm. R.	Publications	Bronze medal.
Johns Hopkins Press.	Scientific periodicals	Gold medal.
Katlinsky, A. L.	Picture cut out of cardboard	Honorable mention.
Lippincott, J. B., Co	Publications	Gold medal.
Little, Brown & Co.	Books, etc	Silver medal.
Lothrop Publishing Co	Publication	Do.
Merriam, G. & C.	Webster Dictionary	Gold medal.
Palmer, Mrs. Lucia A	Books	Honorable mention.
Pasadena Exhibition Association.	France in American magazines	Do.
Publishers' Weekly	Periodicals, etc	Silver medal.
Rosback, Fred. P.	Wire-stitching machine	Do.
Singer Manufacturing Co.	Bookbinding machines	Bronze medal.
Small, Maynard & Co	Publications	Do.
Stone, Herbert S. & Co. ....	.....do	Silver medal.
United States Industrial Publishing Co. ....	.....do	Do.
Von Klenner, Madam K. Evans.	Musical pamphlets	Honorable mention.
White, James, & Co.	Sample book of paper	Do.

GROUP III, CLASS 15.

American Optical Co	Optical goods	Bronze medal.
Bay State Optical Co.	Optical goods and machinery	Honorable mention.
Columbia Phonograph Co., and American Graphophone Co.	Phonographs	Grand prize.
Brandt-Dent Co.	Cash register	Silver medal.
Brashear, John A.	Astronomical instruments	Grand prize.
Brown & Sharpe Manufacturing Co.	Gauges, etc	Gold medal.
Bureau of the Mint	United States coin money, etc.	Grand prize.
Chambers, Inskeep & Co	Ophthalmometer	Bronze medal.
Des Jardins, B. M.	Computing instruments	Gold medal.
Thos. A. Edison	Phonographs	Gold medal.
Ferracute Machine Co	Presses, dies, etc	Do.
Hastings, Prof. Chas. S.	Isochromatic object glasses	Do.
International Arithmachine Co.	Calculating machines	Bronze medal.
King, Julius, Optical Co.	Optical goods	Do.
Le Maitre Optical Co.	Optical goods and machines	Do.
Mills Novelty Co.	Automatic coin-operating machine	Silver medal.
National Cash Register Co	Cash registers, etc	Gold medal.
Scripture, Prof. Edward W	Color sense-tester	Do.
Spencer Optical Co	Optical goods	Bronze medal.
Warner & Swasey	Astronomical instruments	Grand prize.

GROUP III, CLASS 16.

Banning Orthopedic and Mechanical Therapeutic Co.	Appliances for correcting deformities.	Silver medal.
Boldt, H. J.	Operating table	Bronze medal.
Clark, A. C., & Co.	Dentist-chair cuspidors	Do.
Cleveland, Clement.	Operating table	Do.
Harvard Co.	Dental and surgical chairs	Silver medal.
Invalid Chair Co.	Invalid chairs	Bronze medal.
Jackson, Victor H.	Orthodontia	Silver medal.
Kelly, F. D.	Prosthetic dentistry	Gold medal.
Kny, Richard	Hospital washstands	Bronze medal.
Kny-Scheerer Co	Surgical and sick-room supplies.	Silver medal.
Lagal, Geo	Apparatus and instruments	Do.
Marks, A. A.	Artificial limbs	Grand prize.
Meyer, John H.	Artificial teeth	Honorable mention.
Miller Rubber Manufacturing Co.	Specialties in rubber	Silver medal.
Munger, E. E.	Invalid and fracture bed	Bronze medal.
New England Crutch Co.	Crutches	Honorable mention.
Ritter Dental Manufacturing Co	Dental chairs and appliances	Silver medal.
Rorick Air Cushion Truss Co	Air cushions, etc	Do.
Seabury & Johnson	Medicinal and surgical plasters	Do.
Sibley, Gideon	Dental instruments and appliances	Gold medal.

*Three hundred ninety-eight publishers of United States newspapers, periodicals, trade journals, and other publications contributed to this collective exhibit, and under the rule of the Exposition each exhibitor is entitled to the diploma of grand prize.

Exhibitors and collaborators receiving awards in Groups III and XIV, and the grade thereof—Continued.

GROUP III, CLASS 17.

Name of exhibitor.	Exhibit.	Grade of award.
Adek Manufacturing Co.....	Self-playing pianos, etc.....	Bronze medal.
American Steel and Wire Co.....	Music wire.....	Grand prize.
Art Joinery, The.....	Workmanship in wood.....	Bronze medal.
Baldwin Piano Co.....	Pianos.....	Grand prize.
Barnhorn, Clement J.....	Design and carving piano.....	Bronze medal.
Bohmann, Joseph.....	Stringed instruments, etc.....	Silver medal.
Consulvi, Icilio.....	Banjo.....	Bronze medal.
Flagg Manufacturing Co.....	Zithers and harps.....	Silver medal.
Hamilton Organ Co.....	Organs and pianos.....	Do.
Kendall, Chas B.....	Automatic banjos.....	Bronze medal.
Ludwig & Co.....	Pianos and attachments.....	Silver medal.
National Musical String Co.....	Music strings.....	Bronze medal.
Mannello, Angelo.....	Mandolins and guitars.....	Silver medal.
Reindahl, Knute.....	Violins.....	Bronze medal.

GROUP III, CLASS 18.

Andrews, The A. H., Co.....	Opera chairs.....	Bronze medal.
Byron, Joseph.....	Flash-light photo scenes.....	Silver medal.
Chicago Auditorium Association.....	Views of opera house.....	Hors concours.

GROUP XIV, CLASS 87.

American Supply Co.....	Putz Cream (metal polish).....	Honorable mention.
Armour & Co.....	Inedible animal products.....	Gold medal.
Armour Packing Co.....	do.....	Silver medal.
Babbitt, B. T.....	Soaps, etc.....	Gold medal.
Binney & Smith.....	Carbon gas blacks.....	Do.
Blichert, The P. A. Manufacturing Co.....	Shoe polishes.....	Honorable mention.
Bremer, A. R., & Co.....	Coke Dandruff Cure.....	Silver medal.
Cuprigraph Co.....	Sanitary still.....	Honorable mention.
Fiske Bros. Refining Co.....	Lubricating oils.....	Silver medal.
Foederer, Robert H.....	Shoe dressings.....	Honorable mention.
Freck, The Wm., Co.....	Chemical machinery, etc.....	Bronze medal.
Genesee, D.....	Pharmaceutical machinery.....	Honorable mention.
Jandus, William.....	Water filters.....	Bronze medal.
Jaenecke Printing Ink Co.....	Printing inks.....	Do.
Kutnow, S., & Bro.....	Carlsbad salts.....	Honorable mention.
Lambert Pharmacal Co.....	Listerine.....	Bronze medal.
Leonard & Ellis.....	Machinery oils.....	Hors concours.
Matheson, Wm. J., & Co., Ltd.....	White lead.....	Do.
Michigan Carbon Works.....	Gelatins and glues.....	Silver medal.
Muralo Co., The.....	Decorative materials.....	Honorable mention.
Muzzy Brothers.....	Weather and fireproof paints.....	Bronze medal.
Russia Cement Co.....	Fish glues.....	Silver medal.
Seabury & Johnson.....	Medicinal and surgical plasters.....	Do.
Standard Oil Co.....	Petroleum and by-products.....	Grand prize.
Swift & Co.....	Inedible animal products.....	Bronze medal.
Thomsen Chemical Co.....	General chemicals.....	Silver medal.
Tripler Liquid Air Co.....	System of liquifying air.....	Grand prize.
Universal Silver Polish Co.....	Metal polish.....	Honorable mention.
Valentine & Co.....	Coach and car varnishes.....	Gold medal.
Warner, Wm. R., & Co.....	Pills and pharmaceutical products.....	Bronze medal.

GROUP XIV, CLASS 88.

Crane Bros.....	Linen ledger and record papers.....	Gold medal.
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GROUP XIV, CLASS 89.

Blatz, F. J., & Bros.....	Glazed kid.....	Gold medal.
Dungan, Hood & Co.....	do.....	Do.
Foederer, Robt. H.....	Tanned leather.....	Grand prize.
Green, Calvin & Son.....	Sole leather.....	Silver medal.
Hollinger, Amos.....	Harness leather.....	Do.
Leas & McVitty.....	Oak leather and cut soles.....	Gold medal.
Salem Tanning Co.....	Chestnut oak bark leather.....	Bronze medal.
Scherer, Oscar, & Bro.....	Glazed kid, etc.....	Gold medal.
Slocumb, F. F., & Co.....	Leather staking machine, etc.....	Silver medal.
Vacuum Oil Co.....	Leather oils and greases.....	Gold medal.
Vaughn Machine Co.....	Leather staking machine.....	Do.
Wagner Leather Co.....	Finished hides, etc.....	Do.
Woodside Patent Calf Manufacturing Co.....	Patent calf leather.....	Do.
American Tool and Machinery Co.....	Leather cutting machinery.....	Silver medal.

Exhibitors and collaborators receiving awards in Groups III and XIV, and the group thereof—Continued.

GROUP XIV, CLASS 90.

Name of exhibitor.	Exhibit.	Grade of award.
Bremer, A. R., Co	Coke dandruff cure	Bronze medal.
Colgate & Co.	Perfumery, toilet soaps, etc	Grand prize.
Hotchkiss, The H. & G., International Prize Medal Essential Oil Co.	Essential oils	Gold medal.
Reiger, Paul & Co.	Flavoring extracts and perfumes	Honorable mention.
Sen-Sen Company	Sen-sen chewing gum, etc	Silver medal.
Williams, The J. B., Co	Shaving and toilet soaps	Do.

GROUP XIV, CLASS 91.

F. Alfonse	Tobaccos	Honorable mention.
Baltimore Leaf Tobacco Association	Leaf tobacco	Do.
Bimberg, Joseph	do	Do.
Blumenstiel, Levi & Co.	Porto Rican tobacco	Do.
Cincinnati Leaf Tobacco Warehouse Co.	Tobaccos	Do.
Clark, M. H., & Bros.	do	Gold medal.
Cullman Bros.	do	Do.
Cunningham, Col. John S.	do	Do.
Cytron, Otto	Manufactured tobacco	Bronze medal.
Department of Agriculture	Leaf tobacco	Grand prize.
Dibrell Bros.	do	Silver medal.
Florida Havana Co.	Tobacco and seed	Do.
Hagan-Dart Tobacco Co.	Leaf tobacco	Honorable mention.
Havana Commercial Co.	Cigars	Gold medal.
Hoge, Irwin & Co.	Tobacco	Honorable mention.
Jordan, J. F.	do	Do.
Littman, Felix	Tobaccos	Silver medal.
Louisville Leaf Tobacco Exchange	do	Honorable mention.
Manhattan Brass Co.	Brass parts for tobacco machinery	Bronze medal.
Miller, Du Brul and Peters Manufac- turing Co.	Cigar machinery	Gold medal.
Owl Commercial Co.	Tobacco	Do.
Spiller & Robinson	do	Honorable mention.
Strauss, L. L.	do	Do.
The Surbrug Manufacturing Co.	Manufactured tobaccos	Gold medal.
Stahl, jr., Jacob, & Co.	Tobaccos	Do.
Sutter Bros.	do	Honorable mention.
Texas Tobacco Growers' Association	do	Do.
U. S. Tobacco Co.	Tobacco in process of manufacture	Gold medal.
Veitor, E. K., & Co.	Tobaccos	Do.
Wilkinson, W. A.	do	Honorable mention.
Williamson, T. S., & Co.	do	Silver medal.

Collaborators receiving awards in Groups III and XIV, and the grade thereof.

GROUP III, CLASS 11.

Name.	Exhibitor.	Grade of award.
Bordick, John	The Neostyle Manufacturing Co.	Gold medal.
Lowe, H. W.	do	Do.
Bancroft, J. Sellers	Langston Monotype Machine Co.	Silver medal.
Turner, Robert	Jewett Typewriter Co.	Do.
Duncan, Joseph F.	Addressograph Co.	Bronze medal.
Coffin, A. S.	Western Bank Note and Engraving Co.	Do.
Mills, George	do	Do.
Pope, F. I.	do	Do.
Clifford, E. E.	Imperial Manufacturing Co.	Do.
Carl, F.	Barr-Fyke Canceling Machine Co.	Do.
Spire, Charles	Columbia Typewriter Manufacturing Co.	Honorable mention.
Tyrrel, Henry	Frank Leslie Publishing House	Do.
Aronson, Saul	Lambert Typewriter Co.	Do.

CLASS 12.

Byron, P. C.	Joseph Byron	Bronze medal.
Tyler, O. G.	F. G. Schumacher	Do.

Collaborators receiving awards in Groups III and XIV, and the grade thereof—Continued.

CLASS 13.

Name.	Exhibitor.	Grade of award.
March, Francis A.....	The Funk and Wagnalls Co.....	Silver medal.
Loney, Dan. J.....	Geo. Barrie & Sons.....	Bronze medal.
Paul, John W.....	do.....	Do.
Healy, Wm. P.....	Fred. P. Rosback.....	Honorable mention.
Bowker, R. R.....	Publishers' Weekly.....	Do.

CLASS 15.

MacDowel, Jas. B.....	John A. Brashear.....	Gold medal.
Hartman, Wm. B.....	do.....	Do.
Fecker, G.....	Warner & Swasey.....	Do.
Reed, W. E.....	do.....	Do.
Smith, Oberlin.....	Ferracute Machine Co.....	Silver medal.
Janvier, Harry.....	do.....	Bronze medal.
Ware, William.....	do.....	Do.
Bloom, J. C.....	Bay State Optical Co.....	Honorable mention.

CLASS 16.

Roberts, Alfred.....	A. A. Marks.....	Silver medal.
Sibley, D. D. S., Amos H.....	Gideon Sibley.....	Do.
Ritter, Frank.....	Ritter Dental Manufacturing Co.....	Bronze medal.
Fertig, Charles.....	do.....	Do.
Pieper, O. H.....	do.....	Do.
Pieper, A. F.....	do.....	Do.
Morant, Emil.....	A. A. Marks.....	Do.
Kucher, John H.....	do.....	Do.
Kehr, Thomas.....	do.....	Do.
Trott, Phillip.....	do.....	Do.
Cooper, F.....	Gideon Sibley.....	Do.
Pfeiffer, Jacob.....	Miller Rubber Co.....	Honorable mention.
Pfeiffer, W. E.....	do.....	Do.
Brand, A. F.....	The Kny Scheerer Co.....	Do.
Koehler, C.....	do.....	Do.
Beck, F.....	do.....	Do.

CLASS 17.

Macy, J. W.....	The Baldwin Piano Co.....	Gold medal.
Hall, Thomas.....	D. H. Baldwin & Co.....	Bronze medal.
Kerr, Clarence E.....	do.....	Do.
Barnhorn, Clement J.....	do.....	Do.
Iry, William H.....	do.....	Do.
Moran, Horace.....	do.....	Do.
Fullerton, J.....	Flagg Manufacturing Co.....	Do.
Sorrenson, A. J.....	Hamilton Organ Co.....	Do.
Sayler, Harry.....	Ludwig & Co.....	Do.
Liotta, Salvatore.....	Angello Manello.....	Do.
Eichler, Alvin.....	C. B. Kendall.....	Do.
Simshouser, Frank.....	Hamilton Organ Co.....	Honorable mention.
Howland, W. C.....	do.....	Do.
Rose, Edward.....	do.....	Do.
Gunderson, Andrew.....	do.....	Do.
Connors, Joseph.....	do.....	Do.
Schrade, J. L.....	C. B. Kendall.....	Do.
Juscomb, I. F.....	do.....	Do.

CLASS 18.

Kenfield, I. W.....	A. H. Andrews.....	Honorable mention.
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GROUP XIV, CLASS 87.

Berbat, Chas.....	Fiske Bros. Refining Co.....	Bronze medal.
Bourdois, E.....	B. T. Babbitt.....	Do.

CLASS 89.

Mueler, J.....	Robert Foederer.....	Gold medal.
Schmoll, Armand.....	Woodside Patent Calf Mfg. Co.....	Silver medal.
Schmoll, Lucien.....	do.....	Do.



C-1. LIBERAL ARTS FAÇADE, CHAMP DE MARS. VIEW FROM SOUTHEAST.



C-3. REAR OF FAÇADE, LIBERAL ARTS SECTION, CHAMP DE MARS, LOOKING NORTH.

DIRECTOR'S NARRATIVE.

DEAR SIR: In accordance with instructions received from your committee on the preparation of your final report to the President of the United States, I have the honor to submit the following for the department of liberal arts and chemical industries:

The department of liberal arts and chemical industries came into existence December 30, 1899, by the appointment of the writer as its director. From August 23, 1898, until October 10, 1898, the writer served as a member of your staff and one of your committee of directors in the city of Paris, gathering general information upon the subject of the Exposition, methods of transportation, etc., and compiling and transmitting the same to your director in chief of the exhibit departments at the Chicago offices. On October 10, 1898, the writer was appointed by you superintendent of the division of printing and manufacturing machinery, department of electricity and machinery, and continued to remain in Paris and serve as above indicated until ordered, on December 12, 1899, to report to the Chicago offices.

The department of liberal arts and chemical industries was organized in effective form about February 1, 1899. The space areas belonging to the department consisted of the main liberal arts allotment in the palace of liberal arts, Champ de Mars section; the main allotment in the palace of chemical industries, Champ de Mars section; the supplementary allotment in the United States section for civil engineering and transportation, palace of civil engineering and transportation, Champ de Mars section (this supplementary allotment being for the installation of chemical apparatus and machinery); the general area in the Quinonce annex (known as the publishers' building), adjoining the United States allotment for diversified industries; the two small annex buildings in the Quinonce annex, and a portion of the piazza or portico area in front of the United States diversified industries section, Esplanade des Invalides—comprising five separate areas of space, considering that the publishers' building and its two annexes constituted one general area. Later another annex building was added to the publishers' building for the exhibition and operation of stereotyping machinery.

With the advice and consent of your director in chief of the exhibit departments and your approval, a plan of open, sequence installation was adopted and maintained throughout the work of this department.

This plan consisted of open façades and the abandonment of all booths, partition walls, or constructions that would obstruct the view of the entire section from the front, sides or rear, and the elimination of decorative features for class sections or individual space allotments.

The following table gives the gross amount of space allotted to this department, the location of the different sections, the amount of space set apart for general circulation, and the net exhibit areas:

Location of space.	Group.	Gross allotment.	Aisle circulation. ^a	Net exhibit space.
Liberal arts proper.....	III	<i>Sq. ft.</i> 9,035	<i>Sq. ft.</i> 3,483	<i>Sq. ft.</i> 5,552
Piazza diversified industries section.....	III	1,031	510	521
Publishers' building, Quinconce.....	III	9,357	1,455	7,902
Chemical industries proper.....	XIV	6,221	2,738	3,483
Chemical apparatus and machinery ^b	XIV	1,887	333	1,554
Publishers' building annex, Nos. 1, 2, and 3 ^c	III	854	220	634
Total.....		28,385	8,739	19,646

^a Exclusive of circulation provided by exhibitors and for Government and loan exhibits.

^b Space located in Group VI.

^c Annex No. 1 devoted to stereotyping room; annex No. 2, press headquarters; annex No. 3, exhibits of journals, publications, and periodicals, and reading room.

This plan contemplated the division of general areas into class sections with circulating aisles around all sides of such sections and of massing the exhibits in one general sequence form in the respective department spaces. Thus photography and everything relating to that art was confined to its specific class area, beginning at a fixed physical point with apparatus and general materials and ending with finished products; likewise the musical section, the sequence in this area consisting of materials, processes, and products.

To carry this plan into force and effect required either the abandonment of façades or the adoption of some form or front architectural adornment that would harmonize with the idea. Eventually a façade in the earlier American colonial style of architecture was selected for the liberal arts section, the coloring of the façade and its corresponding entresol being in pure white; the furniture, cases, etc., in dark mahogany, with the wall and screen mattings in soft green shades, and the selection of open booth pavilions for the chemical industries area.

Upon this plan the general areas were divided into class sections, correspondence entered into with proposing exhibitors, and allotments of space made.

In order to increase the general area and provide office room for exhibitors in the regular liberal arts section, Champ de Mars, an entresol practically 16 feet wide by 78 feet long was constructed in the rear of this section and against the west wall of the main building. This

entresol had stairways at both ends and its architectural design was the same as that of the façade.

At the beginning of the work of this department a comparison of the classification requirements and the applications for space on file with the limitations of space allotted to the department developed the fact that applications from proposing exhibitors in three classes alone called for an amount of space equivalent to three times the total of the areas available for the entire thirteen classes. Immediately following the distribution of the Commissioner-General's book of general information upon the subject of the Exposition the demands for space in this department rapidly arose to an amount equal to five times the total available space. Following instructions to adhere strictly to the requirements of the classification, and secure exhibits for every division of every class, if possible, and treat United States exhibits in this department from a purely national aspect, a vigorous and energetic campaign was prosecuted among producers whose products were desirable in the classes where no space had been applied for and who had not been previously inspired to go to the expense and trouble of making an exhibition at Paris. In this work the department was

<i>Assignments and occupancy of space.</i>	
GROUP III.—LIBERAL ARTS.	
	Number of space as- signments.
Class 11	a 104
Class 12	25
Class 13	b 429
Class 14	4
Class 15	27
Class 16	39
Class 17	37
Class 18	4
Total	669
GROUP XIV.—CHEMICAL INDUSTRIES.	
Class 87	39
Class 88	c 1
Class 89	13
Class 90	9
Class 91	d 33
Total	95
Total number of exhibitors	764
<i>a</i> Includes 29 collaborators in the exhibit of the American Society of National Advertisers. <i>b</i> Includes 400 contributors to collective exhibit of journals, publications, and periodicals; exhibited in annex to publishers' building. <i>c</i> Installed in space of Group XV, class 92. <i>d</i> Installed in space of Group VII, class 41.	

fairly successful, eventually securing exhibits for every one of the thirteen classes except that of machinery, processes, and products in

the paper industry. However, as no bond or money deposit was required to hold space at the pleasure of proposing exhibitors, several of the more important exhibits were withdrawn almost at the last moment of the work of this department in the United States. This was particularly the case with the manufacturers who had combined to make an exhibit of bookbinding machinery, causing some embarrassment to the department in completing the sequence of this class without too great duplication of exhibits. It is the opinion of the head of this department that in future work of this character proposing exhibitors should be compelled to make a deposit sufficient for all purposes, subject to forfeiture in case of failure to exhibit.

In the collection and transportation of exhibit material this department was relieved of all responsibility except in cases of Government and loan exhibits, private exhibitors having been instructed to place themselves in communication with responsible shipping agents at points of origin, who, through their coastwise representatives, usually made direct connections, via steamship companies and European shipping agents, to the point of destination. A small portion of the loan exhibit material was collected at the Chicago offices, packed under the direct supervision of the department, and shipped to the United States auxiliary cruiser *Prairie* through the New York or Baltimore warehouse of the Commissioner-General. The exhibits of the United States Treasury Department, i. e., those of the Bureau of Engraving and Printing and Bureau of the Mint and the literature of the various governmental departments, were rendezvoused, under the supervision of the chief clerk of the Treasury Department, with the storekeeper of the Treasury Department, the latter attending to the details of packing and shipping these exhibits to the Baltimore warehouse of the Commissioner-General. The exhibits of journals, periodicals, and general publications, comprising nearly 400 separate exhibits, were shipped from points of origin to the New York warehouse of the Commissioner-General, and there packed, under the supervision of this department, in shipping cases of convenient size and forwarded by the *Prairie* and the French Railway Line of the West direct to the exhibition space.

But little difficulty was experienced during the period of installation except that which arose from negligence on the part of exhibitors to ship their material within the date prescribed by the department, from failure on the part of many European correspondents of American shipping companies to complete the route of travel from the French seaport to the exhibit space and to provide adequate facilities for tracing delayed or lost exhibits, and from the traditionally slow methods of French contractors and workmen. The ill-fated steamer *Pauillac* carried down with her three exhibits belonging to this department. These exhibits represented individual allotments of space in the chem-

ical section. Two of the exhibits were quickly duplicated. The embarrassment of the department, in the face of demands by others for these spaces, was confined to holding them subject to the arrival of

Following table gives the number and weight of packages shipped for the department of liberal arts and chemical industries by the United States auxiliary cruiser <i>Prairie</i> and other vessels. Those shipped by vessels other than the <i>Prairie</i> contained material belonging to exhibitors:		
Steamer.	Number of packages.	Weight of packages (in kilos).
Forwarded by steamship <i>Prairie</i>	a 245	a 39,711
Forwarded by other vessels.....	1,337	225,369
Total.....	1,582	265,080
Weight in pounds		583,176
a Consisting of façades, decorative material, furniture, governmental, and loan exhibits.		

the duplicate exhibits and the hope that the *Pauillac* would eventually reach port.

In returning exhibit material to the United States the outgoing methods were practically pursued. Private exhibitors either packed their own material or had it done, and then turned it over to shipping agents, and the loan and Government exhibits were repacked in their original cases and delivered to the Commissioner-General's French shipping agent for transportation to the *Prairie* at Havre.

All the façades, the entresol, the screens for wall exhibits, the moldings for the friezes, the matting for the partitions separating the United States liberal arts section from those of adjoining countries, the metal railing which surrounded the scientific section, the posts used for supporting the cords which defined the circulation in and about class sections, the exhibition cases for the exhibits of the Bureau of the Mint, Treasury Department, and the literature of the various Governmental Departments, the bookcases for the exhibition of publications and periodicals, the furniture for the typewriter section, and the furniture for the offices in the liberal arts department proper and the publishers' building, having been purchased in the United States and shipped to the exhibition spaces direct, it remained only necessary to place this material in position with United States artisans and workmen taken to Paris for the purpose. All of the façades in this department, and the furniture for the typewriter section and the offices of the liberal arts department proper, and the furniture for the office in the publishers' building were paid for by funds subscribed by

exhibitors. The façade and the entresol in the liberal arts section were designed and contracted for by the decorative department, and the entire expense of the same, except the cost of transportation, was borne by the exhibitors who occupied the spaces under the façade. Both these structures were placed in position by the contractor. The cases which contained the exhibit material of the governmental departments were shipped to the Exposition in "knockdown" form and set up upon the space by the United States builder. At the close of the Exposition these cases were shipped to the Treasury Department, with the consent of the Commissioner-General.

The director of this department, accompanied by his secretary, together with the superintendent of the publishers' building and the expert for the chemical industries section, arrived in Paris on February 8, 1900.

By direction of the Commissioner-General the assistant commissioner-general, collaborating with the French architect, had contracted with a French builder to complete the publishers' building ready for occupancy by February 1, 1900. This French builder not only failed to fulfill his contract, but went into liquidation. By energetic efforts on the part of this department, however, and at some extra expense, the building was finally finished, the exhibits completely installed, the building officially opened, and the first number of the New York Times issued on May 30, 1900.

The installation of Group III, Champ de Mars, was completed, and this section thrown open to visitors on April 14, 1900, the official opening day of the Exposition.

Owing to the loss of the steamer *Pauillac*, to neglect on the part of exhibitors to ship their material within the prescribed time, and to tardiness on the part of French forwarding agents the chemical industries section, Champ de Mars, was not completely installed until about May 15, 1900.

If there was any one feature which more than another tended to expedite the installation in this department, it was the preparation in advance in the United States of the decorative material, furniture, etc., and the taking to Paris of United States workmen to place it in position.

The façades and general decorative material in this department were insured under a general policy taken out by the Commissioner-General.

A member of this department was bonded for the safe custody of the exhibits supplied by the Treasury Department—those of the Bureau of the Mint and the Bureau of Engraving and Printing.

Awards to exhibitors and collaborators.

[Groups III and XIV.]

EXHIBITORS.

	Number of exhibitors.	Hors concours.	Grand prize.	Gold medal.	Silver medal.	Bronze medal.	Honorable mention.	Total awards.
Group III:								
Class 11..	a 104	.....	b 6	c 22	26	12	2	68
Class 12..	25	.....	1	7	12	4	3	27
Class 13..	d 429	.....	b 4	5	7	9	6	31
Class 14..	4	.....	.....	.....	.....	.....	.....	.....
Class 15..	27	.....	4	7	2	6	1	20
Class 16..	39	.....	1	2	9	6	2	20
Class 17..	37	.....	2	.....	5	7	.....	14
Class 18..	4	1	.....	.....	2	1	.....	4
Group XVI:								
Class 87..	39	1	2	5	8	11	10	37
Class 88..	1	.....	.....	1	.....	.....	.....	1
Class 89..	13	.....	1	8	5	1	.....	15
Class 90..	9	1	1	1	2	1	2	8
Class 91..	33	2	1	10	4	1	13	31
Total..	764	5	23	68	82	58	40	276

a Including 12 contributing exhibitors to the commercial printing office, publishers' building, and 29 contributing exhibitors to the exhibit of hangers, calendars, etc., by the American Society of National Advertisers.

b Counting but one grand prize for the model commercial printing office, which combined the exhibits of 12 manufacturers; and counting but one grand prize on the exhibit of journals and publications, in which there were 400 different exhibits; consequently, each contributing exhibitor in both instances is entitled to the use of the grand prize.

c Counting but one award for the 29 exhibits made by the American Society of National Advertisers, each exhibitor being entitled to the use of the award.

d Including 400 publications and journals, and 49 contributing exhibitors to the exhibit of posters, and cover designs by the American Society of National Advertisers.

COLLABORATORS.

	Gold medal.	Silver medal.	Bronze medal.	Honorable mention.	Total awards.
Group III:					
Class 11.....	2	2	6	4	14
Class 12.....	.....	.....	2	.....	2
Class 13.....	.....	1	2	2	5
Class 14.....	.....	.....	.....	.....	.....
Class 15.....	4	1	2	1	8
Class 16.....	.....	2	9	5	16
Class 17.....	1	.....	10	7	18
Class 18.....	.....	.....	.....	1	1
Group XIV:					
Class 87.....	.....	.....	2	.....	2
Class 88.....	.....	.....	.....	.....	.....
Class 89.....	1	3	.....	.....	4
Class 90.....	.....	.....	.....	.....	.....
Class 91.....	.....	.....	.....	.....	.....
Total	8	9	33	20	70

RECAPITULATION.

	Hors concours.	Grand prize.	Gold medal.	Silver medal.	Bronze medal.	Honorable mention.	Total awards.
Exhibitors	5	23	68	82	58	40	276
Collaborators.....	.....	.....	8	9	33	20	70
Grand total.....	5	23	76	91	91	60	346

The preceding table of awards to exhibitors and collaborators in Groups III and XIV is compiled from the records of the French Official Journal of August 18, 1900, information transmitted to this department subsequent to that date and during the Exposition, and the decisions of the French Exposition authorities and proof sheets of the French Official Journal, yet to be published, which were forwarded from Paris to the Chicago offices. It will therefore be understood that the accuracy of these tables can not be guaranteed, for the French Official Journal (not yet published), which is supposed to contain a correct list of all awards granted at the Paris Exposition, may change it in many respects.

The law requires that the report of the Commissioner-General be delivered to the President within four months after the close of the Exposition. As awards at an exposition comprise that which is of most value to exhibitors, the above tables have been compiled and are herewith submitted in order that exhibitors in this department may have the benefit of the information in the possession of the department, in so far as it is possible to have it correct, in advance of the publication of the French Official Journal, the date of which has not been fixed.

DESCRIPTION OF EXHIBITS.

[Group III.]

APPLIANCES AND GENERAL PROCESSES RELATING TO LITERATURE, SCIENCE, AND ART.

[Classes 11 to 18, inclusive.]

CLASS 11.—*Typography.*

VARIOUS PRINTING PROCESSES, EQUIPMENT, AND PRODUCTS.

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits in this class occupied spaces numbered 1, 2, 5, 7, 14, 15, 16, 17, 18, 25, 27, 36, 41, 56, 57, 58, 59, 61, 62, 63, 64, 75, 79, 80, and space No. 88 on plan of installation, diversified industries, Groups XII and XV, Esplanade des Invalides. See plan of installation, publishers' building, Esplanade des Invalides, 2, 5, 10, 11, 13, 14, 17, 18, 19, 21, 24, 25, 27, 28, 29, and 30.]

The specimens typifying the various processes in the art of printing were exhibited in the regular liberal arts section, palace of liberal arts, Champ de Mars. The exhibits were installed upon wall space and screens, the latter being taken mostly from the United States for the purpose. The principal exhibitors were: The American Society of National Advertisers, Chicago, with a collection of hangers, posters, and calendars contributed by 29 different members of the association, representing practically all the important cities of the United States; the American Three Color Company, Chicago, specimens of three-color process work; George Barrie & Sons, Philadelphia, engravings, etchings, and color facsimiles; the Bureau of Engraving and Printing, Treasury Department, Washington, D. C., specimen prints of United

States money, bonds, certificates, postal and revenue stamps; the Chicago Colortype Company, Chicago, three-color process specimens showing mostly reproductions of drawings from articles of merchandise; the Frank Leslie Publishing House, New York, original art sketches in water color, wash drawings, pen-and-ink specimens; W. J. Morgan & Co., Cleveland, lithographic reproduction of Rosa Bonheur's painting, "The Horse Show," and portrait of President McKinley; National Association of Photo-Engravers, Chicago, mezzotint impressions of photo-mechanical reproduction processes; Tiffany & Co., New York, copper and steel plate and intaglio printing, stamping, and embossing from dies; George J. Verbeck, Chicago, specimens of bank-note engraving; Western Bank Note and Engraving Company, Chicago, steel plate engraving and printing specimens; the Heinicke-Fiegel Lithographing Company, St. Louis, specimens of commercial lithography; the Inland Printer Company, Chicago, specimens of printing; the John J. Mitchell Company, New York, specimens of printing in the production of fashion plates; the Chicago Art Colortype Company, specimens of color printing processes; the United States Government Printing Office, Washington, specimens of typography, reports of the Executive Departments, scientific publications, etc. James White & Co., of Chicago, exhibited a book of samples of printing and art papers. Under this classification the Meyercord Company, Chicago, made an exhibit of decalcomania transfer specimens from both vegetable and mineral colors. The R. H. Smith Manufacturing Company, Springfield, Mass., and J. F. Tenney & Co., Chicago, made exhibits of rubber type, office stamps, and sign makers' outfits.

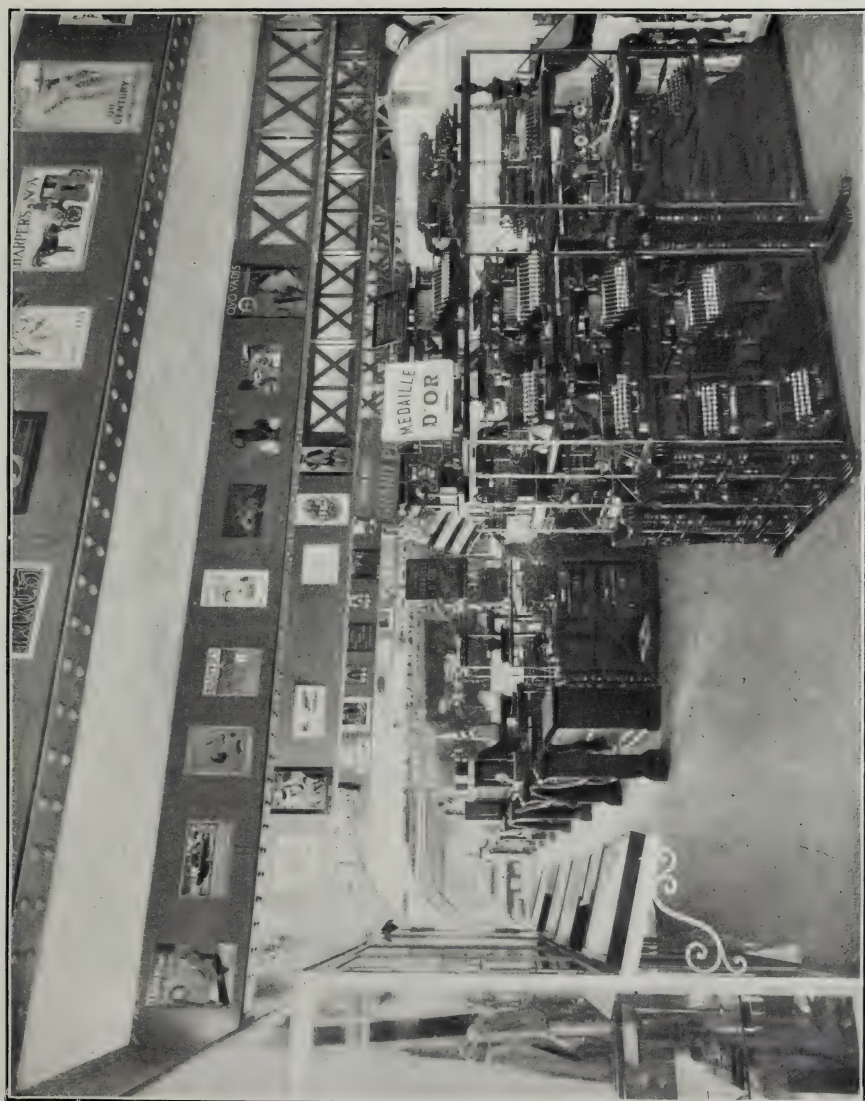
The following is a list of the members of the American Society of National Advertisers who contributed to the collective exhibit in this class: American Lithograph Company, New York City, calendars; California Fig Syrup Company, San Francisco, Cal., lithograph; Drummond Tobacco Company, St. Louis, Mo., lithograph; G. H. Dunston & Co., Buffalo, N. Y., lithograph; N. K. Fairbank & Co., Chicago, Ill., calendars and signs; Gillim Print Company, New York City, theatrical lithographs; Gray Lithograph Company, New York City, calendar; Greve Lithograph Company, Milwaukee, Wis., lithographs; Harter Medicine Company, Dayton, Ohio, lithograph; Hawes Hats, New York City, lithographs; The Hilson Company, New York City, lithographs; C. I. Hood & Co., Lowell, Mass., lithographs; Kaufmann & Strauss Company, New York City, lithographs; Leggett & Myers, St. Louis, Mo., lithograph; Liebig Company, New York City, advertising cards; Liebig Extract of Beef Company, New York City, lithograph; Liebig Extract of Meat Company, New York City, lithograph; Matthews-Northrup Company, Buffalo, N. Y., lithograph; Michigan Stove Company, Chicago, Ill., lithograph; Niagara Lithograph Company, Buffalo, N. Y., lithographs and calendars; J. Ottman Lithograph Company, New York City, lithographs; Pond's Extract Com-

pany, New York City, advertising cards; Pope Manufacturing Company, Hartford, Conn., lithograph; J. L. Prescott & Co., New York City, lithograph; Rogers & Wells, Chicago, Ill., calendars; Sherwood Lithograph Company, Chicago, Ill., lithograph; Street & Smith, New York City, lithograph; Swift & Co., Chicago, Ill., lithographs; J. C. Witter, New York City, lithograph.

The official installation of typewriting machines and typewriting machine accessories and supplies was made in the liberal arts section, Champ de Mars. This exhibition was participated in by twenty-one manufacturers. The installation consisted of typewriting machines displayed on what is known as Yesbera frames, with the addition of single machine typewriting desks for demonstrating purposes. During the earlier part of the Exposition the typewriting desks, with operators demonstrating the working of the different machines, were located in the entresol, while the general exhibition of typewriting machines was located on the main floor of the liberal arts space. During the latter half of the Exposition this condition was reversed, and that part of the exhibition relating directly to the demonstration of machines was made upon the ground floor of the liberal arts space, while the display of machines was transferred to the entresol.

The Remington Standard Company and the Remington-Sholes Company made retrospective exhibits of the Remington typewriting machine, the installations being located in the official typewriter section, under the entresol. Many United States manufacturers of typewriting machines were represented by European agents who were unfamiliar with local conditions in America. Most of these agents, as is so much the European practice, were apparently determined to obliterate the individuality of the United States manufacturers represented as well as the merit of their products, for the purpose of emphasizing their (the agents') personalities. A majority of the exhibitors neglected to have United States citizens as representatives upon the ground at the opening of the Exposition, or at any time. Such persons would have comprehended the situation, limitations of space, etc., and taken advantage of all opportunities. Strenuous efforts were made on the part of French agents and certain United States exhibitors in this section to have the installation rearranged to their liking; but the plan originally adopted prevailed during the entire period of the Exposition; and this plan was to give the largest possible representation to this industry in the regular official typewriter section, rather than confine the exhibition to one of selection, to the exclusion of the many, as was the rule.

The following is a list of those exhibiting in this section: American Writing Machine Company, New York (the New Century writing machine); the Blickensderfer Manufacturing Company, Stamford, Conn.; Chicago Writing Machine Company, Chicago; Columbia Type-



C-10. INSTALLATION IN ENTRESOL, LIBERAL ARTS SECTION, CHAMP DE MARS, LOOKING NORTH.

writer Manufacturing Company, New York (the Columbia bar-lock machine); Densmore Typewriter Company, New York; A. A. Dick Company, Chicago (Edison mimeograph); Franklin Typewriter Company, New York; the Hammond Typewriter Company, New York; Jewett Typewriter Company, Des Moines, Iowa; the Oliver Typewriter Company, Chicago; Pittsburg Writing Machine Company, Pittsburg; Remington-Sholes Company, Chicago; the Smith Premier Typewriter Company, Syracuse, N. Y.; John Underwood & Co., New York (typewriter supplies); Wagner Typewriter Company, New York (the Underwood writing machine); Williams Typewriter Company, Derby, Conn.; the Remington Standard Typewriter Company (Wyckoff, Seamans & Benedict), New York; Yost Writing Machine Company, New York.

The exhibition of postal canceling and other post-office apparatus and machines, classified in class 11, Group III, liberal arts, was made by the following companies, and formed a part of the model United States post-office located in the United States National Pavilion: American Postal Machine Company, Boston, stamp canceling machine; Barr-Fyke Canceling Machine Company, Kansas City, stamp canceling machine; Barry Postal Supply Company, Oswego, N. Y., stamp canceling machine.

CLASS 12.—*Photography.*

EQUIPMENT, PROCESSES, AND PRODUCTS.

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits belonging to this class occupied spaces numbered 3, 4, 23, 40, 42, 53, 54, 69, 70, 71, 72, 73, 74, 76, 77, and 78.]

The most important exhibits in this class were those of the Eastman Kodak Company, Rochester, N. Y., which consisted of kodaks, photographic apparatus, and photographs; Bausch & Lomb Optical Company, Rochester, N. Y., lenses, shutters, photographic instruments, and photographs, and the exhibit of Curtis & Cameron, Boston, photographs known as "Copley prints." The exhibit of the Eastman Kodak Company and that of Bausch & Lomb occupied the façade front of the liberal-arts section, while a general contribution on the part of Curtis & Cameron was utilized to form a frieze along the upper portion of the partitions which separated the United States liberal-arts space from that of France on one side of the section and Germany on the other. Molding to correspond with that used upon the façade was taken to Paris for the purpose of establishing the lines of this frieze. The Copley prints were placed upon sheets of matting attached to the wall, covered with glass, and held in position by an upper and lower molding, so that this frieze constituted a decorative connecting link between the façade, which established the front line of the liberal-arts section, and the entresol which formed the back or rear wall of this section. In addition to the prints used in the frieze, Curtis & Cameron

made a separate exhibit, consisting of a collection of Copley and Sepia prints, all of them being reproductions from works by American artists. The next most important and attractive feature of the photographic section was the artificial-light photographs exhibited by George R. Lawrence, Chicago.

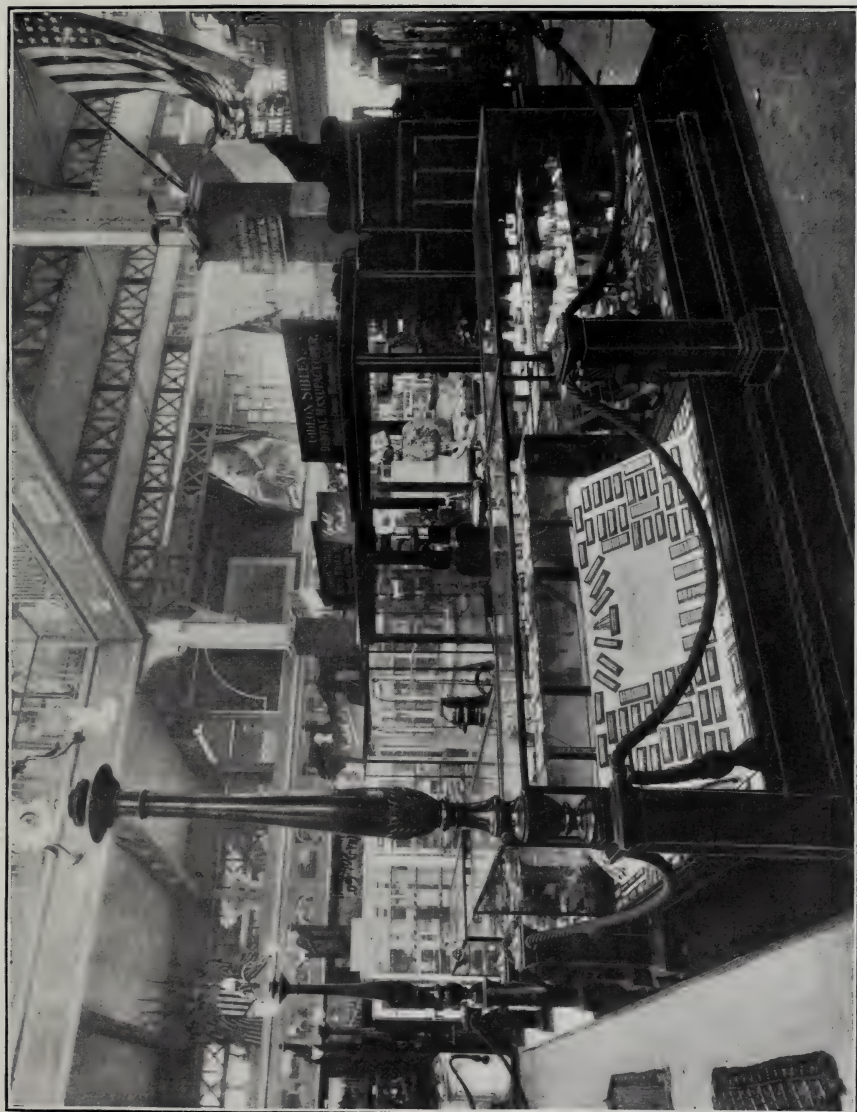
The exhibition of photographic print papers, which could be demonstrated only by actual prints, was made by the American Aristotype Company, Jamestown, N. Y., and the Nepera Chemical Company, Neperan, N. Y. The exhibit of general photographic supplies was made by the Photo-Materials Company, Rochester, N. Y. The exhibitors of general photography, with the character of the exhibit made by each, were as follows: The Baker Art Gallery, Columbus, Ohio, genre photographs; C. E. Bolles, Brooklyn, N. Y., yachting and marine views; W. N. Brenner, Cincinnati, Ohio, portraitures; Burton Photographic Company, New York, yachting scenes; Joseph Byron, New York, theatrical flash-light views; W. F. Corne, Boston, photographic reproduction, Mater Doloroso; Charles Richards Dodge, Washington, D. C., exteriors; Annie B. Johnson, Washington, portraitures; F. G. Schumacher, Los Angeles, Cal., studio photography; George Steckel, Los Angeles, Cal., studio photography; and the Taber Photographic Company, San Francisco, Cal., general photographs and carbon prints.

The exhibition of photography as applied to color printing was made by the Chicago Colortype Company and the Osgood Art Colortype Company, Chicago. One of the most attractive exhibits in this class was that of Max Levy, Philadelphia, which consisted of screens for half-tone processes and proofs from engravings. The products of this manufacturer have a most favorable international reputation because of the perfection of line spacing, uniformity, and sharpness. The Popular Photograph Company, New York, made an exhibit of apparatus for instantaneous tintype photography. The exhibit of stereotypes and stereoscopic views was made by H. C. White & Co., North Bennington, Vt., while that of colored photographs of American Indians was displayed by F. A. Rinehart, Omaha, Nebr. The exhibition of apparatus and materials for obtaining and reproducing cinegraph photographs, moving pictures, etc., was confined to the installation of Siegmund Lubin, Philadelphia.

CLASS 13.—*Books, musical publications, bookbinding (equipments and products), newspapers, posters.*

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits belonging to this class were installed in spaces numbered 6, 8, 9, 10, 11, 12, 37, 38, 75. See plan of installation, publishers' building, Esplanade des Invalides, 4, 12, 26, and all of No. 32, publishers' building, reading-room annex.]

All exhibits in this class, except bookbinding equipment and newspapers and periodicals, were installed in the regular liberal-arts section, Champ de Mars. The most prominent exhibitors in this class



C-8. DENTAL FURNITURE AND SUPPLY INSTALLATION, LIBERAL ARTS SECTION, CHAMP DE MARS.



C-9. ENTRESOL, REAR OF LIBERAL ARTS SECTION, CHAMP DE MARS, LOOKING SOUTH.

displayed their products in individual free, open, exhibition cases, which cases formed the front line of this particular section, while the collective exhibits of individual publishing houses occupied fixed areas in wall cases. The section was located in the southwest division of the general liberal-art space and under the entresol. (The exhibition of bookbinding equipment is referred to in the report on the publishers' building.)

The following standard publishing houses made exhibits in this section devoted to class 13: A. S. Barnes & Co., New York; George Barrie & Son, Philadelphia; W. E. Benjamin, New York; Blumenberg Press, New York; The Century Company, New York; Dana, Estes & Co., Boston; Funk & Wagnalls Company, New York; William R. Jenkins, New York; Johns Hopkins Press, Baltimore; J. B. Lippincott Company, Philadelphia; Little, Brown & Co., Boston; Lothrop Publishing Company, Boston; G. P. Putnam's Sons Company, New York; Herbert S. Stone & Co., Chicago; United States Industrial Publishing Company, New York.

The following members of the American Society of National Advertisers, Chicago, made a collective exhibit of posters and cover designs in this class, these exhibits being installed on wall space: Achert & Henckel Lithograph Company, Cincinnati, Ohio, posters; Adams & Westlake Company, Chicago, Ill., poster; Ainslee & Co., Howard, New York City, cover designs; American Cereal Company, Chicago, Ill., posters; American Lithograph Company, New York City, posters; Art Amateur, The, New York City, posters; Baker, Walter, & Co., Dorchester, Mass., poster; Bien, Julius, & Co., New York, posters; Bookman, The, New York City, posters, Century Company, The, New York City, cover designs; Courier Company, Buffalo, N. Y., posters; Denslow, W. W., Chicago, Ill., posters; Dew Drop Cigar Company, New York City, poster; Dunston, G. H., & Co., Buffalo, N. Y., cover designs; Edwards, Deutch & Heitman, Chicago, Ill., poster; Fairbank, N. K., Company, Chicago, Ill., poster; Franco-American Soup Company, New York City, cover design; Gillen Lithograph Company, Philadelphia, Pa., posters; Greve Lithograph Company, Milwaukee, Wis., posters; Harper Brothers, New York City, posters; Hart, Shafner & Marx, Chicago, Ill., posters; Hood, C. I., & Co., Lowell, Mass., posters; Inland Printer Company, The, Chicago, Ill., poster; Kaufman & Strauss Company, New York City, posters; Ketterlinus Lithograph Company, Philadelphia, Pa., posters; Leggett & Meyers, St. Louis, Mo., poster; Liberty Cycle Company, Bridgeport, Conn., poster; Liebig Extract of Meat Company, New York City, posters; Michigan Stove Company, Chicago, Ill., poster; Niagara Lithograph Company, Buffalo, N. Y., posters; Orcutt Lithograph Company, New York City, posters; Ottman, J., Lithograph Company, New York City, posters; Pabst Brewing Company, Milwaukee, Wis., poster; Pond's Extract Company, New York City, poster; Prang, L.,

& Co., Boston, Mass., cover design; Pyle, James, New York City, posters; Rogers & Wells, Chicago, Ill., poster; Round Oak Stove Works, Dowagiac, Mich., poster; Sherwood Lithograph Company, Chicago, Ill., posters; Soper, J. H., Gardner, New York City, cover design; Sterling Remedy Company, Attica, Ind., posters; Stokes, Frederick A., & Co., New York, posters; Street & Smith, New York City, cover design; Strowbridge Lithograph Company, Cincinnati, Ohio, posters; Thomas & Wylie Lithograph Company, New York, poster; Walker, George H., & Co., Boston, Mass., posters; Wellman & Dwyer Tobacco Company, St. Louis, Mo., poster; Winship & Co., Chicago, Ill., poster; Woman's Home Companion, Springfield, Ohio, cover designs.

Following is a list of the publications which formed the collective exhibit of journals and periodicals in class 13 and which were displayed in the reading room annex to the publisher's building:

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| The Parisian, New York. | The Advance, Chicago. |
| Ainslee's Magazine, New York. | The Baptist Teacher, Philadelphia. |
| International Monthly, New York. | The Baptist Superintendent, Philadelphia. |
| McClure's Magazine, New York. | The Senior Quarterly, Philadelphia. |
| The National Magazine, Boston. | The Advanced Quarterly, Philadelphia. |
| Century Magazine, New York. | The Intermediate Quarterly, Philadelphia. |
| New England Magazine, Boston. | The Primary Quarterly, Philadelphia. |
| St. Nicholas, New York. | The Advocate of Peace, Boston. |
| The Bookman, New York. | The Sailor's Magazine, New York. |
| Overland Monthly, San Francisco. | American Catholic Quarterly Review, Philadelphia. |
| The Connecticut Magazine, Hartford. | Sendebud, Battlecreek, Mich. |
| New England Kitchen Magazine, Boston. | Vaktare, Battlecreek, Mich. |
| The American Kitchen Magazine, Boston. | Advent Review and Sabbath Herald, Battlecreek, Mich. |
| The Black Cat, Boston. | Youths' Instructor, Battlecreek, Mich. |
| The Forum, New York. | Bi-Monthly Guild, Richmond, Va. |
| The Review of Reviews, New York. | The Churchman, New York. |
| Brush and Pencil, Chicago. | The Christian Endeavor World, Boston. |
| The Outlook, New York. | Ave Maria, Notre Dame, Ind. |
| Harper's New Monthly Magazine, New York. | African Methodist Episcopal Church Review, Philadelphia. |
| Great Pictures, Chicago. | Journal and Messenger, Cincinnati, Ohio. |
| The Independent, New York. | The Living Church, Chicago. |
| De Lestry's Western Magazine, St. Paul. | The Light of Truth, Columbus. |
| The Literary News, New York. | Der Lutherische Herald, New York. |
| Tales from Town Topics, New York. | The Interior, Chicago. |
| Life, New York. | The New Church Review, Boston. |
| Judge, New York. | Deaconess' Advocate, Chicago. |
| Leslie's Weekly, New York. | Woman's Evangel, Dayton, Ohio. |
| Puck, New York. | Herald and Presbyter, Cincinnati. |
| Town Topics, New York. | Lietuva, Chicago. |
| Harper's Weekly, New York. | Christlicher Hausfreund, Battlecreek, Mich. |
| The Art Amateur, New York. | |
| Ladies' Home Journal, Philadelphia. | |
| The Living Age, Boston. | |
| Mida's Criterion, Chicago. | |
| Mida's Illustrated Magazine, Chicago. | |

- Sandtbudget, Chicago.
 Baltimore Methodist, Baltimore.
 The Peacemaker and Court of Arbitration, Philadelphia.
 The Young Woman's Journal, Salt Lake City, Utah.
 Philadelphia College of Pharmacy, Philadelphia.
 Educational Speciaity Co., Detroit, Mich.
 Blumenberg Press, New York.
 The Watchman, Boston.
 Zion's Herald, Boston.
 Faith and Works, Philadelphia.
 International Messenger, New York.
 Katolischen Jugendfreund, Chicago.
 The Presbyterian and Reform Review, Philadelphia.
 Our Young People, Milwaukee.
 The Missionary Review of the World, New York.
 The Homiletic Review, New York.
 Mission Studies, Chicago.
 Lutheran Witness, Chicago.
 The Colporteur, Philadelphia.
 Young People, Philadelphia.
 Signs of the Times, Oakland, Cal.
 Table Talk, Philadelphia.
 Library Journal, New York.
 Ceramic Studio, New York.
 The Literary Digest, New York.
 The Pathfinder, Washington.
 Judge Library, New York.
 The Ledger Monthly, New York.
 Woman's Tribune, Washington.
 One Hundred Years of American Commerce, New York.
 Confectioners' Journal, Philadelphia.
 International Confectioner, Chicago.
 Western Tobacco Journal, Cincinnati.
 Tobacco, New York.
 Confectioners and Bakers' Gazette, New York.
 The Kansas Farmer, Topeka.
 American Agriculturist, New York.
 Orange Judd Farmer, New York.
 The Farmers' Review, Chicago.
 Hospodar, Omaha.
 Farm and Home, Springfield.
 New England Homestead, New York.
 The Agricultural Epitomist, Indianapolis.
 The Farm Implement News, Chicago.
 The Implement Age, Philadelphia.
 Farm Machinery, St. Louis.
 The Modern Miller, St. Louis.
 The Bakers' Helper, Chicago.
 The Northwestern Miller, Minneapolis.
 The Rider and Driver, New York.
 Harness, New York.
 Carriage Monthly, Philadelphia.
 The Horseman, Chicago.
 The Breeders' Gazette, Chicago.
 The Live Stock Journal, Chicago.
 The Live Stock Inspector, Woodward, Okla.
 The Butchers' Advocate, New York.
 The American Fertilizer, Philadelphia.
 The Practical Dairyman, Indianapolis.
 The American Florist, Chicago.
 American Knit Goods Review, New York.
 The Sartorial Art Journal, New York.
 New Methods in Education, New York.
 Geological and Natural History Survey of Minnesota, Minneapolis, Minn.
 Musical Courier, New York.
 Mining and Scientific Press, San Francisco.
 Dry Goods Economist, New York.
 Railroad Gazette, New York.
 Kindergarten Magazine, Chicago.
 The Journal of Commerce, St. Joseph, Mo.
 The Weavers' Herald, Lyons, Kans.
 Mines and Minerals, Scranton, Pa.
 American Primary Teacher, Boston, Mass.
 Modern Methods, Boston, Mass.
 City Government, New York.
 American Journal of Mathematics, Baltimore, Md.
 Export Implement Age, Philadelphia, Pa.
 The Red Radford Review, Chicago.
 The Journal of Education, Boston, Mass.
 Journal of the United States Artillery, Fort Monroe, Va.
 New Orleans Medical and Surgical Journal, New Orleans.
 Shoe and Leather, New York.
 Lietuvas, Chicago.
 The Bibliotheca Sacra, Oberlin, Ohio.
 Our Little Friend, Oakland, Cal.
 Our Animal Friends, New York.
 Bankers' Magazine, New York.
 Engineering Magazine, New York.
 Municipal Engineering, Indianapolis.
 Sibley Journal of Engineering, Ithaca, N. Y.
 Shoe and Leather Reporter, New York.
 Hardware Dealers' Magazine, New York.

- The Haberdasher, New York.
 Locomotive Engineering, New York.
 National Engineer, Chicago.
 Technology Quarterly, Boston.
 Hotel Monthly, Chicago.
 Advertising Pocket Directory, Chicago.
 Anthony's Photographic Bulletin, New York.
 Cycle and Automobile Trade Journal, Philadelphia.
 American Homes, Knoxville, Tenn.
 Compressed Air Production, New York.
 St. Louis and Canadian Photographer, St. Louis, Mo.
 The Argus, Chicago.
 The Brewers' Journal, New York.
 Telegraph Age, New York.
 American Druggist and Pharmaceutical Record, New York.
 The Inland Architect, Chicago.
 The Inland Printer, Chicago.
 The Starchroom, Cincinnati.
 Scientific American, New York.
 The Hotel World, Chicago.
 The National Builder, Chicago.
 Shoe and Leather Reporter, Boston.
 American Artisan, Chicago.
 Varnish, Philadelphia.
 Architectural Studies, Chicago.
 The Standard, Boston.
 National Laundry Journal, Chicago.
 The Iron Age, New York.
 Alkaloidal Clinic, Chicago.
 The American Amateur Photographer, New York.
 American Digest, St. Paul.
 Professional Photographer, Buffalo, N. Y.
 Merck's Archives of the Materia Medica and its Uses, New York.
 The Textile World, Boston.
 Process Review, Buffalo, N. Y.
 Occidental Medical Times, San Francisco, Cal.
 Manufacturing Interest of the State of Pennsylvania, Philadelphia.
 Pennsylvania Medical Journal, Pittsburg.
 The Medical World, Philadelphia.
 Chicago Vegetarian, Chicago.
 The Hotel Gazette and Outing News, Los Angeles, Cal.
 The Herold Kalender, Milwaukee, Wis.
 Circular Philadelphia Textile School, Philadelphia.
 Journal of Eye, Ear, and Throat Diseases, Baltimore.
 National Newspaper Directory and Gazetteer, Boston.
 The Phonographic World, New York.
 The Delineator, New York.
 The Shoe Retailer, New York.
 Rough Notes, Indianapolis.
 The Sartorial Art Journal, New York.
 Success, New York.
 Hardware, New York.
 American Machinist, New York.
 American Street Railway Investments, New York.
 Electrical World and Engineer, New York.
 Army and Navy Register, Washington.
 United States Army and Navy Journal, New York.
 The Star, Oak Park, Ill.
 The Engineer, Cleveland, Ohio.
 The Daily Cardinel, Madison, Wis.
 Boston Ideas, Boston.
 Music Trade Review, New York.
 New York Commercial, New York.
 American Journal of Insanity, Baltimore.
 American Journal of Philology, Baltimore.
 The Krestauský Posel, Chicago.
 The Woman's Journal, Alliance, Ohio.
 School of Mines, New York.
 The Review, Port Huron, Mich.
 American Chemical Journal, Baltimore.
 Yale Medical Journal, New Haven, Conn.
 Practice of Pharmacy, Philadelphia.
 American Anthropologist, New York.
 A Hand Book of Industrial Organic Chemistry, Philadelphia.
 American Journal of Obstetrics, New York.
 Pacific Health Journal, Oakland, Cal.
 Medical Era, Chicago.
 St. Louis Medical and Surgical Journal, St. Louis.
 The American Journal of Pharmacy, Philadelphia.
 Planets and People, Chicago.
 The Bookkeeper, Detroit, Mich.
 The Publishers' Weekly, New York.
 United States Dispensatory, Philadelphia.
 Pharmaceutical and Medical Chemistry, Philadelphia.
 American Journal of Medical Sciences, Philadelphia.
 Progressive Medicine, Philadelphia.
 The American Geologist, Minneapolis.
 Textile World's Directory, Boston.

- The Mercantile Adjuster, St. Louis.
 The Medical News, New York.
 Meyer Brothers' Druggist, St. Louis.
 The National Druggist, St. Louis.
 Science, New York.
 The Era Druggist Directory, New York.
 The Era Blue Book, New York.
 The Pharmaceutical Era, New York.
 Western Druggist, Chicago.
 The Clothiers' and Haberdashers' Weekly, New York.
 Monumental News, Chicago.
 The Clay Worker, Indianapolis.
 Official Guide of the Railways, New York.
 Journal of the American Medical Association, Chicago.
 Medical Record, New York.
 Merck's Report, New York.
 The Metal Worker, New York.
 The Medical Fortnightly, St. Louis.
 The Age of Steel, St. Louis.
 Ice and Refrigeration, Chicago.
 Cement and Engineering News, Chicago.
 American Exchange and Review, Philadelphia.
 Street Railway Journal, New York.
 Electrical Review, New York.
 American Electrician, New York.
 The Marine Record, Cleveland, Ohio.
 Camp News, Philadelphia.
 Wisconsin Druggist Exchange, Janesville, Wis.
 Sewing Machine Times, New York.
 The Brickbuilder, Boston.
 Engineering Magazine, New York.
 Studies in Historical and Political Science, Baltimore.
 Advertising Experience, Chicago.
 Profitable Advertising, Boston.
 Printers' Ink, New York.
 Engraver and Electrotyper, Chicago.
 Hubbard's Newspaper and Bank Directory of the World, New Haven, Conn.
 United States Counterfeit Detector, New York.
 Lord & Thomas's Statistics of American Newspapers, Chicago.
 The Fern Bulletin, Binghamton, N. Y.
 Gleanings in Bee Culture, Medina, Ohio.
 The National Nurseryman, Rochester, N. Y.
 American Poultry Advocate, Syracuse, N. Y.
 The Farm-Poultry, Boston.
- Der Gefluegel-Zuechter, Hamburg, Wis.
 Birds of All Nature, Chicago.
 Agricultural Advertising, Chicago.
 The Western Brewer, Chicago.
 Bonfort's Wine and Spirit Circular, New York.
 The Trade, Baltimore.
 Merchants' Review, New York.
 St. Louis Lumberman, St. Louis.
 Atlanta Journal, Atlanta, Ga.
 Augusta Chronicle, Augusta, Ga.
 Brooklyn Citizen, Brooklyn.
 Buffalo Express, Buffalo.
 Boston Herald, Boston.
 Boston Post, Boston.
 Baltimore American, Baltimore.
 Burlington Daily Free Press, Burlington, Vt.
 Chicago Times-Herald, Chicago.
 Chicago Daily Tribune, Chicago.
 Chicago Chronicle, Chicago.
 Chicago Journal, Chicago.
 Chicago Record, Chicago.
 Chicago Daily Inter-Ocean, Chicago.
 Cincinnati Enquirer, Cincinnati.
 Commercial-Appeal, Memphis, Tenn.
 Chattanooga Daily Times, Chattanooga, Tenn.
 Cleveland Plain Dealer, Cleveland, Ohio.
 Commercial-Tribune, Cincinnati.
 Denver Times, Denver.
 Daily Picayune, New Orleans.
 Des Moines Leader, Des Moines, Iowa.
 Democrat-Chronicle, Rochester, N. Y.
 Evening News, Detroit, Mich.
 Evening Journal, Jersey City, N. J.
 Evening Herald, Syracuse, N. Y.
 Galveston Daily News, Galveston, Tex.
 Indianapolis Sentinel, Indianapolis.
 Indianapolis Journal, Indianapolis.
 Indianapolis Times, Indianapolis.
 Kansas City Journal, Kansas City.
 Journal and Courier, New Haven, Conn.
 Louisville Dispatch, Louisville.
 Morning Oregonian, Portland, Oreg.
 Milwaukee Journal, Milwaukee.
 Mail and Express, New York.
 Nebraska State Journal, Lincoln, Nebr.
 Newark Evening News, Newark, N. J.
 Nashville Banner, Nashville, Tenn.
 New York Times, New York.
 New York Herald, New York.
 New York Tribune, New York.
 New York Journal, New York.
 New York Press, New York.

Pittsburg Dispatch, Pittsburg, Pa.
 Pioneer Press, St. Paul, Minn.
 Philadelphia Record, Philadelphia.
 Public Ledger, Philadelphia.
 Pittsburg Leader, Pittsburg, Pa.
 Pittsburg Chronicle and Telegraph, Pittsburg, Pa.
 Providence Daily Journal, Providence.
 St. Paul Globe, St. Paul, Minn.
 St. Paul Dispatch, St. Paul, Minn.
 St. Louis Globe-Democrat, St. Louis.
 St. Louis Republic, St. Louis.
 St. Louis Post-Dispatch, St. Louis.
 St. Louis Star, St. Louis.
 Salt Lake Tribune, Salt Lake.
 Utica Daily Press, Utica, N. Y.
 Wichita Daily Eagle, Wichita, Kans.
 Woonsocket Evening Reporter, Woonsocket.
 The News, Denver, Colo.
 The Times, Los Angeles, Cal.
 The Evening Wisconsin, Milwaukee, Wis.
 The Times-Democrat, New Orleans, La.
 The Evening Post, New York.
 Commercial Advertiser, New York.
 The Call, Philadelphia.
 The Evening Bulletin, Philadelphia.
 The Evening News, Rochester, N. Y.
 The Evening Star, Washington, D. C.
 The Dayton, Ohio, News, Dayton.
 The Dayton, Ohio, Journal, Dayton.
 The Rocky Mountain News, Denver.
 News and Courier, Charleston, S. C.

Rochester Times, Rochester, N. Y.
 The News, Indianapolis, Ind.
 American 3 Color Company, Chicago.
 Ayers' Newspaper Directory, Philadelphia.
 Brooklyn Eagle Guide to Exposition.
 Bureau of American Republics, Commercial Directory, Washington, D. C.
 California Fruit Grower.
 Daily Drivers.
 Dexter Folder Company, Pearl River, N. Y.
 Dixie Miller, Nashville, Tenn.
 Express-Gazette, Cincinnati, Ohio.
 Fishing Gazette, New York.
 Hotel Red Book and Directory, New York.
 Home Addressing Company, Philadelphia, Pa.
 Lumber Trade Journal, New York.
 Manufacturers' Record, Baltimore, Md.
 William McKinley Souvenir Committee, Philadelphia, Pa.
 Michigan Artisan, Grand Rapids, Mich.
 Philadelphia Board of Trade, Philadelphia, Pa.
 American Musical Club Directory, New York.
 Popular Science, New York.
 Progressive Age, New York.
 Retail Druggist, Detroit, Mich.
 C. Lindsay Ricketts, Engrossed Cards.
 Telephone Magazine, Chicago.
 Trade Journal, Richmond, Va.

CLASS 14.—*Maps and apparatus for geography, cosmography, and typography.*

[See plan of installation, publishers' building, Esplanade des Invalides. The only exhibit in this class installed by the department of liberal arts and chemical industries was located on wall space created by closing the exit in the publishers' building between spaces No. 25 and No. 26.]

The department was disappointed in not receiving exhibits promised by United States producers in this class. The only exhibit under this classification installed by the department was that of Lord & Thomas, Chicago, well-known advertising agents. Their exhibit consisted of a cartographic tabular illustration of the newspaper and publishing industry of the United States. Their map of the United States, which was very large, gave the States and Territories in outline, and by indicating characters designated each and every city that produced one or more recognized publications. The exhibit, while attracting a great deal of attention from a statistical standpoint, did not receive that appreciation from the jury of awards in class 14 which its character warranted, owing to the fact that this jury examined

exhibits alone for their general cartographic excellence, and not for statistical value, which was the prevailing feature of this very excellent exhibit. The same exhibitor, however, was included in an award of grand prize in class 13.

On the map the States were separated into divisions, on each of which was indicated the area in square miles, the population, the number of publications, the circulation per issue, and the percentage of circulation to population. The data for this exhibit was collected and compiled during the year 1899, and was intended to show the conditions existing in the year of the Exposition, 1900. Below the map all the data was recapitulated, as follows:

States and Territories.	Population.	Number of publications.	Combined circulation per issue.	Per cent of circulation per issue to population.	Value of plants.	Number of employees.	Average hours of labor per week.	Average wages per week.	Columns of reading published annually.	Average cost per inch yearly advertising.
Alabama.....	1,800,000	240	293,310	16.3	\$213,950	1,425	57	\$17.00	368,832	\$7.10
Arizona.....	100,000	54	48,553	48.5	57,500	225	60	14.50	158,600	7.75
Arkansas.....	1,500,000	280	270,004	18	231,800	1,500	60	15.85	514,856	6.05
California.....	1,500,000	732	1,937,383	129.5	1,754,800	5,250	60	17.50	2,750,000	7.85
Colorado.....	500,000	334	592,579	118.5	625,200	2,778	59	16.25	1,011,060	6.45
Connecticut.....	900,000	197	562,331	62.5	571,000	1,980	57	17.00	673,160	8.50
Delaware.....	190,000	45	100,069	52.6	90,000	208	60	16.50	116,690	6.95
Dist. of Columbia	300,000	77	848,395	282.8	209,200	600	57	19.25	153,350	18.00
Florida.....	550,000	162	152,728	27.8	144,500	930	59	14.90	269,692	6.32
Georgia.....	2,200,000	357	714,650	32.5	652,600	2,625	57	15.75	908,240	7.87
Idaho.....	150,000	81	48,749	32.5	53,900	350	60	15.30	149,064	7.15
Illinois.....	4,500,000	1,669	9,445,311	209.9	4,175,000	9,984	55	20.75	5,811,468	9.35
Indiana.....	2,500,000	847	1,754,557	70.2	1,051,900	5,250	58	17.15	3,811,750	7.25
Indian Territory	341,900	84	62,211	18.1	75,400	500	60	15.50	160,016	6.75
Iowa.....	2,200,000	1,060	1,694,698	77	1,190,000	6,750	57	16.75	2,123,610	6.60
Kansas.....	1,500,000	721	829,036	55.3	650,000	3,750	60	15.80	1,625,340	6.85
Kentucky.....	2,100,000	313	937,749	44.5	400,000	1,795	60	18.15	756,420	7.28
Louisiana.....	1,500,000	226	404,933	26.9	305,500	1,450	59	17.85	533,320	6.45
Maine.....	675,000	179	5,944,681	880.7	612,000	1,990	60	15.00	398,880	19.75
Maryland.....	1,200,000	210	779,703	64.9	399,800	1,400	58	19.50	456,480	8.10
Massachusetts	2,750,000	599	6,496,924	236.9	2,389,900	5,050	59	21.10	1,935,320	11.50
Michigan.....	2,500,000	797	2,119,967	84.5	1,025,500	4,700	59	15.90	2,722,500	6.75
Minnesota.....	1,800,000	650	1,745,858	96.9	751,500	4,000	59	18.00	1,435,560	6.05
Mississippi.....	1,500,000	211	182,860	12.2	204,600	1,220	58	14.75	504,712	5.87
Missouri.....	3,200,000	1,005	4,209,028	102.8	2,131,000	6,510	59	18.50	1,895,700	8.00
Montana.....	250,000	95	131,102	52.4	93,950	480	60	17.30	198,900	7.75
Nebraska.....	1,200,000	614	681,536	56.8	553,900	3,480	60	15.00	989,088	6.35
Nevada.....	50,000	32	17,866	35.7	32,500	125	60	16.50	91,400	8.10
New Hampshire	400,000	116	243,046	60.7	219,500	675	60	17.65	378,350	7.60
New Jersey.....	1,900,000	371	582,162	30.6	384,500	2,000	58	18.75	959,450	9.50
New Mexico.....	200,000	56	44,502	22.2	55,800	275	60	16.50	105,664	8.10
New York.....	7,000,000	2,059	28,148,472	402.1	9,668,000	15,390	59	21.15	6,534,800	18.15
North Carolina	1,900,000	260	309,570	16.2	298,800	1,500	57	15.25	667,668	6.00
North Dakota	200,000	161	141,049	70.5	132,000	650	60	15.75	235,000	6.87
Ohio.....	4,200,000	1,224	6,860,597	189.6	2,350,000	9,230	59	19.75	4,792,800	7.25
Oklahoma.....	200,000	136	138,509	69.2	105,100	650	60	15.25	251,240	6.85
Oregon.....	400,000	204	317,967	79.5	257,800	1,175	58	18.80	429,720	9.00
Pennsylvania.....	6,250,000	1,436	11,095,488	177.5	4,988,000	11,176	59	20.50	4,518,880	15.00
Rhode Island	425,000	67	291,678	40.4	168,100	450	57	17.00	250,520	9.00
South Carolina	1,400,000	136	193,518	13.8	149,600	800	57	14.85	307,320	6.65
South Dakota	340,000	266	238,512	70.2	197,500	1,125	60	15.00	440,800	6.87
Tennessee.....	2,000,000	299	1,232,363	61.6	310,750	1,920	58	17.50	601,076	8.85
Texas.....	3,000,000	812	1,142,323	38.1	891,400	5,393	59	19.50	1,406,216	7.50
Utah.....	300,000	79	139,305	46.4	83,600	460	60	17.50	145,400	8.20
Vermont.....	335,000	77	146,958	43.9	138,800	500	60	15.75	199,720	7.75
Virginia.....	1,800,000	248	354,364	19.7	328,200	1,400	60	16.60	588,120	7.85
Washington.....	450,000	219	263,232	58.5	243,500	1,075	60	17.50	377,750	9.20
West Virginia.....	900,000	192	259,700	28.8	295,400	1,860	50	16.85	544,464	5.95
Wisconsin.....	2,200,000	579	1,452,792	66	750,200	4,090	57	16.00	1,882,080	6.50
Wyoming.....	100,000	44	26,408	26.4	41,500	220	60	16.00	91,375	6.75
Total.....	75,356,900	21,012	96,629,236	128.2	42,706,950	138,319	58.8	17.10	57,732,421	8.28

The exhibit of relief maps of the Yosemite Valley and the State of California, made by the California Paris Exposition Commission, relief maps of the United States, and relief maps of the West Indies and the Caribbean Sea, made on the part of the United States Navy Department, although classified in class 14, were physically exhibited in other United States sections.

CLASS 15.—*Instruments of precision, coins, and medals.*

APPLIANCES, PROCESSES, AND PRODUCTS.

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits belonging to this class were installed in spaces numbered 13, 26, 28, 30, 31, 39, 48, 68. See plan of installation, diversified industries, Groups XII and XV, Esplanade des Invalides, space No. 90.]

The United States had the distinction of exhibiting in this class the only complete series of astronomical instruments shown in one single section of the Exposition. This exhibit was made possible by the energy and generosity of Messrs. Warner & Swasey, Cleveland, Ohio, and Messrs. John A. Brashear, Charles S. Hastings, Henry A. Rowland, and associates. The exhibit consisted of one equatorial telescope with objective $11\frac{1}{2}$ inches in diameter, clear aperture, the principal technical features of which were quick motion in right ascension dial for reaching true right ascension, coarse hour circle and microscopes for reading fine hour circle, clamps and slow motion in right ascension and declination, operated at the eye end of the instrument, the clock being governed by a double conical pendulum. The illumination of the micrometer in this instrument was obtained by means of a single electric lamp, which gave either a bright field and a dark wire or a bright wire and a dark field, as well as light for reading the position circle and the micrometer head. The other instruments exhibited by Messrs. Warner & Swasey consisted of one 3-inch combined transit and zenith telescope, one 2-inch azimuth, one chronograph, one 2-inch field telescope, two Warner & Swasey prism binoculars, and one sextant of the same design as that made by these manufacturers for the United States Government. All the circles of the instruments exhibited by Warner & Swasey were graduated on a dividing engine which was constructed specially for the work. The maximum error of the automatic gradations of this engine are less than one second of an arc. Charles S. Hastings exhibited isochromatic glasses; Henry A. Howland, diffraction gratings, and John A. Brashear, one large spectroscope with photographic attachments, one small spectroscope, photographic telescope with objective $4\frac{1}{2}$ inches in diameter for circular photographic plates $10\frac{1}{2}$ inches in diameter, astronomical visual objectives $11\frac{1}{2}$ inches in diameter and 6 inches in diameter, respectively, one solar eyepiece, one blairising solar eyepiece, Herschel prism, plane parallel sextant mirrors, Hastings-Brashear reversing prisms, refractometer plates, plane and parallel, and a miscellaneous

collection of astronomical objectives, defraction gratings with rulings 15,000 lines to the inch, and a collection of prisms and oculars.

The exhibition of accurate measuring instruments, standard gauges, micrometers and verniers, index and surface plates, etc., was made by the Brown & Sharpe Manufacturing Company, Providence R. I., while that of automatic adding and registering machines, cash registers, computing instruments, calculating machines, and automatic coin-operating vending machines was made by the American Arithmometer Company, Washington, D. C.; the National Cash Register Company, Dayton, Ohio; the Brandt-Dent Company, Watertown, Wis.; B. M. Des Jardins, Hartford, Conn.; the International Arithmachine Company, and the Mills Novelty Company, Chicago, respectively. Prof. Edward W. Scripture, New Haven, Conn., exhibited one of his color sense testers for detection of color blindness and visual color weakness.

The exhibition of optical goods, optical instruments, and eye-testing apparatus (located physically in the United States space of diversified industries, Esplanade des Invalides) was made by the American Optical Company, Southbridge, Mass.; Bay State Optical Company, Attleboro, Mass.; Hygienic Optical Company, New York; Jules King, New York; Le Maitre Optical Company, New York; Siegmund Lubin, Philadelphia; John Simon, and the Spencer Optical Company, New York.

Duplicates of the medals issued by the United States, specimens of all United States circulating coin money, Lafayette coin dollars and dies for making the same, together with a series of presses, dies, and other machinery for the manufacture of medals, coins, and metal badges made by the Ferracute Machine Company, Bridgeton, N. J., formed a part of the scientific section, augmented by an exhibit of the coins and medals owned by the American Numismatic and Archaeological Society, New York.

CLASS 16.—*Medicine and surgery.*

APPLIANCES, INSTRUMENTS, AND APPARATUS FOR WORK IN ANATOMY, HISTOLOGY, AND BACTERIOLOGY, DENTAL INSTRUMENTS AND DENTAL SUPPLIES, AND INSTRUMENTS FOR VETERINARY SURGERY.

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits belonging to this class were installed in spaces numbered 2, 22, 32, 34, 35, 43, 44, 45, 46, 47, 55, and 67.]

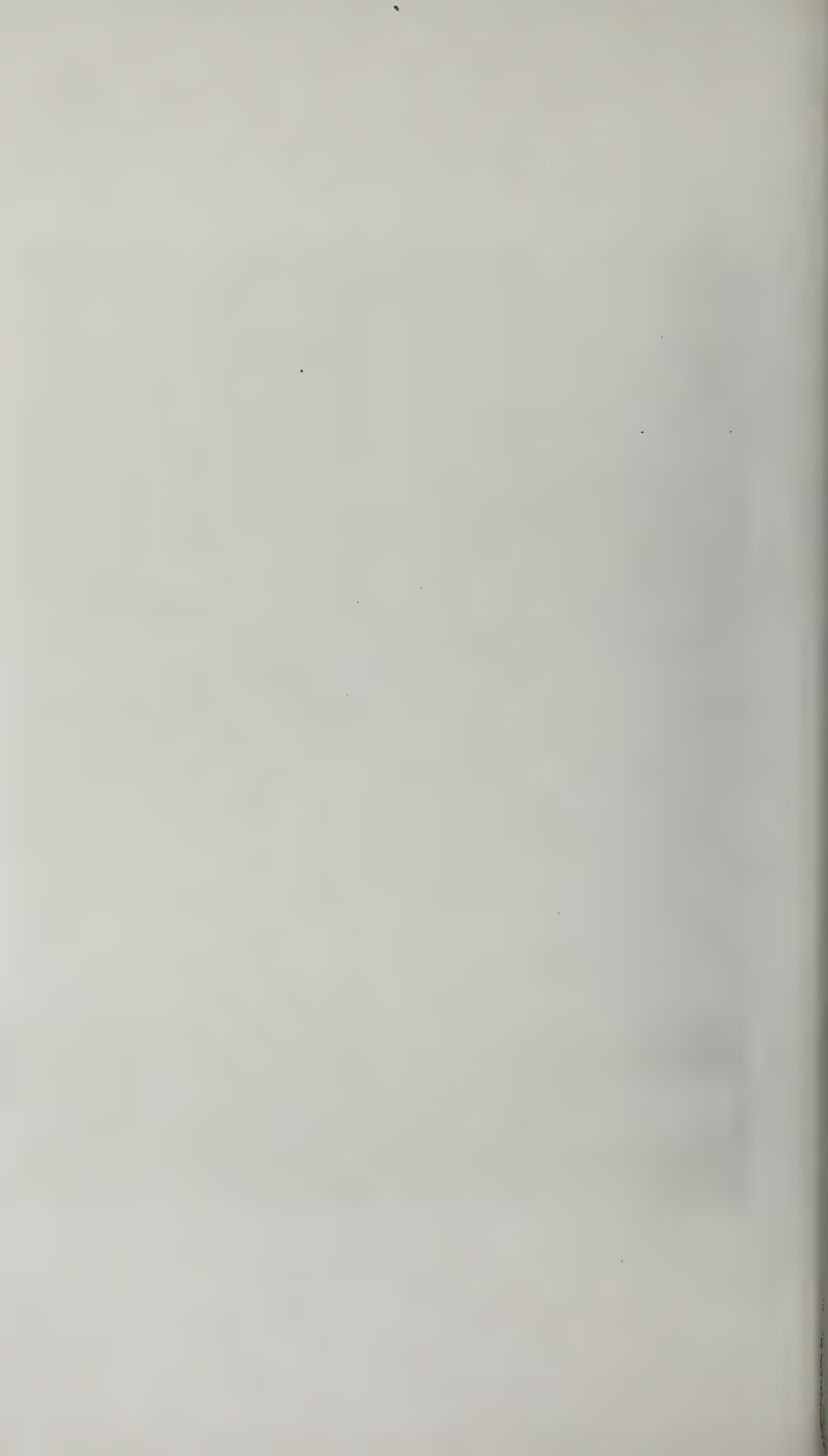
The principal old-established United States surgical instrument manufacturers were solicited to make exhibits of their products in this class in competition with foreign makers, but none of them would consent to do so. It was therefore decided, in order to follow the requirements of the classification, to make an exhibit of aseptic general hospital furniture, operating tables, sterilizing apparatus, etc., for which the Kny-Scheerer Company, of New York, the United States manufacturer selected to make the exhibit, had become justly famous.

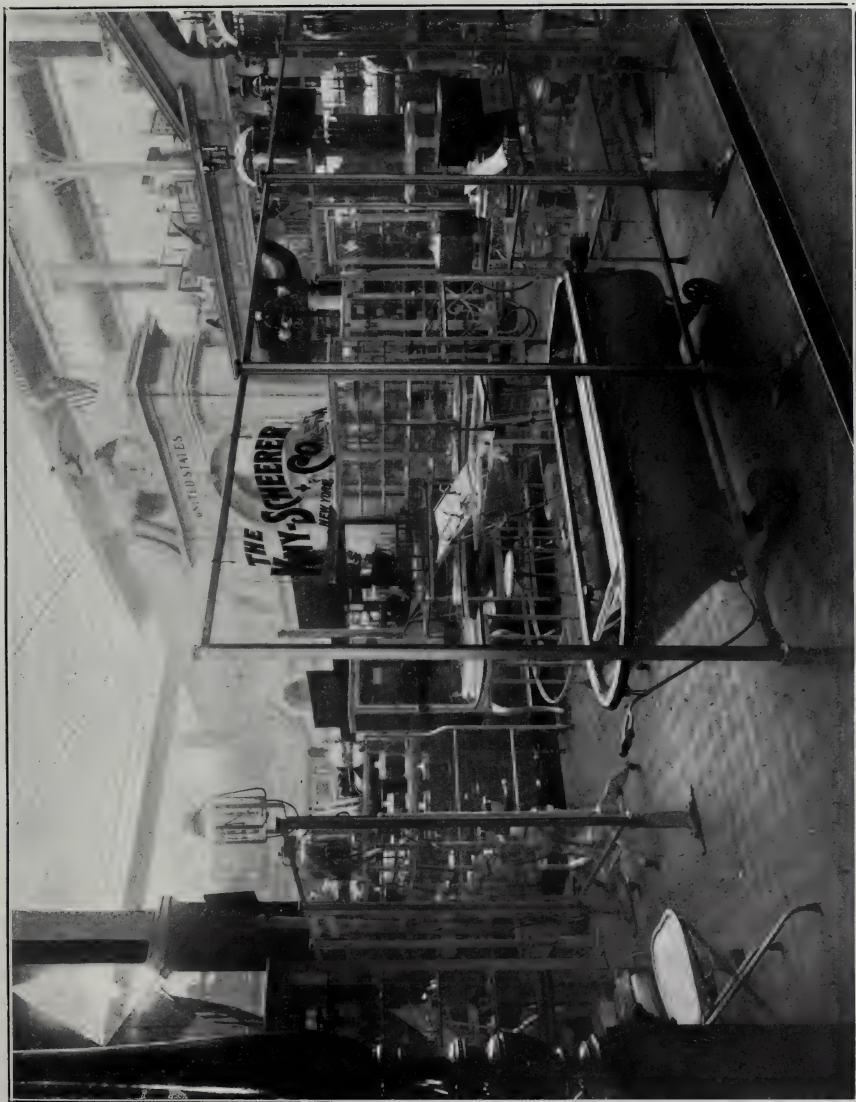
Consequently the United States made the only exhibit of a complete surgical theater shown at the Exposition. The material was well selected and the installation admirably provided for, but owing to the failure of the Exposition authorities to supply the necessary service the steam sterilizing apparatus could not be exhibited in operative form. Much thought and care had been given to the idea of exhibiting a complete surgical theater, distinctly cataloguing the specific character and meaning of the entire exhibit; but, unfortunately for the department, and relatively so for the exhibitor in the matter of awards, the jury did not, for some unexplainable reason, place that appreciation upon the exhibit which its merits unquestionably warranted. Everybody connected with the participation of the United States in the Exposition had been given ample opportunity to know that one of the principal features of the Commissioner-General's efforts on this occasion would be the dedication of the Lafayette monument in Paris on July 4, yet the jury, with a United States representative acting upon it, decided to examine exhibits in this class on July 4. The exhibitor, practically all his representatives, and the members of this department being absent from the space attending the unveiling ceremonies, naturally the points of excellence in this exhibit were not presented to the entire jury in a forceful manner, which was not the case with the foreign exhibits examined by the same jury, and not on national holidays. As a result, the award bestowed was of a low grade. The jury was composed of 12 Frenchmen, 2 Germans, and 1 American. Inquiry developed that the jury had evidently allowed itself to be misinformed as to the exact theme and merit of this particular exhibit. It was not an exhibit of surgical instruments. A few instruments not of United States manufacture were displayed in the aseptic iron instrument cabinets to show the meritorious features of the latter. After this apparent injustice had been wrought against the exhibitor by the class jury the case was appealed to the group jury, and while a larger number of awards were thus ultimately secured for exhibitors in this particular class, the group jury still, unjustly in the opinion of the head of this department, declined to reopen the case and thus permit an effort to be made to raise the grade of the award bestowed upon the exhibitor of the material which made up the surgical theater, although exhibitors in foreign sections, displaying material in this class of an apparent inferior character, received awards of a higher grade. The Kny-Scheerer Company sold numerous duplicates of the exhibited articles during the Exposition, and in most instances the articles purchased were for use in European hospitals or clinics.

The exhibit occupied the left central section of the liberal arts space and consisted of a surgical operating theater, sterilizing laboratory, amarium chirurgicum, and a collection of hospital supplies. As previously stated, the surgical theater features were selected, installed,



C-5. LOOKING NORTH THROUGH REAR OF LIBERAL ARTS SECTION, CHAMP DE MARS.





C-6. VIEW INTO SURGICAL THEATER, LIBERAL ARTS SECTION, CHAMP DE MARS; INSTALLATION SURROUNDED BY PLATE GLASS.

and conducted by the Kny-Scheerer Company, 17 Park place, New York, this company being the manufacturer of all the apparatus, operating tables, cabinets, and general hospital furniture, and largely of the supplies displayed. The operating room and aseptic operating furniture was constructed entirely of metal and glass, and the theater was surrounded by plate glass 6 feet high. Besides the general operating tables, sterilizing devices, and hospital supplies, the special features consisted of the surgical operating tables of J. H. Bolt, M. D., New York; gynæcological operating table of Clement Cleveland, M. D., New York; electro-endoscopic instruments for examining the rectum, H. A. Kelly, M. D., Baltimore; the aseptic wheel stretcher of A. F. Brand, Brooklyn; glass bowls for preserving vaseline in sterilized form, J. D. Bloom, M. D., New Orleans; storage battery for galvano-caustic operations on the prostate gland, Willy E. Meyer, M. D., New York; set of anasthosis forceps, Ernest Laplace, M. D., Philadelphia; aseptic glass hospital washstand, Richard Kny, New York; pocket sputum flask for tuberculosis patients, S. A. Knopf, M. D., New York; formal generator with automatic diaphragm pressure valve, E. S. Beck, New York; model of invalid and fracture bed, E. E. Munger, M. D., Spencer, Iowa; apparatus for the sterilization of catgut by cumol, J. C. Clark, M. D., New York. The sterilizing room was supplied with a series of apparatus for the sterilization of dressing material, operating and wearing apparel, and devices for keeping dishes, water, and instruments under steam pressure of 250° F. The instrument room was equipped with a complete set of aseptic iron instrument cabinets, constructed entirely of iron and glass, in order to withstand thorough and rapid disinfection, each cabinet being supplied with vessels containing, separately, formaldehyde tablets and chloride of calcium, and a hydrometer for determining the percentage of moisture. The surgical instruments and tools included practically everything employed by American surgeons in modern hospital practice and were divided into five sections, as follows:

SEC. 1. Dissecting, post-mortem and physiological diagnostic, and anthropometric instruments; apparatus for the analysis of the urine and blood.

SEC. 2. Amputating, osteotomy, bullet-extracting, trepanning, plaster of paris dressing, aspirating, pocket-case and wound-dressing instruments.

SEC. 3. Ophthalmic, aural, nasal, dermal and uranoplastic, oral, and laryngeal instruments.

SEC. 4. Urethral, urocytic, cystolithic, hernial, intestinal, anal, and rectal instruments.

SEC. 5. Gynecological, obstetrical, uterine-diagnostic, dressing, vesico-vaginal-fistula, hysterectomy, and ovariectomy instruments.

The display of veterinary instruments and appliances made by the Kny-Scheerer Company occupied a position immediately adjoining the division devoted to the hospital bedroom.

The exhibition of medical and surgical plasters, surgical dressings, and specialties in connection with this surgical theater was installed

by Seabury & Johnson, New York. It consisted of a carefully selected line of medicated plasters, surgical dressings, plasters in combination with rubber, rubber adhesive plasters, surgical isinglass plasters, absorbent lint, absorbent cottons, antiseptic cottons, absorbent, plain, and medicated gauzes, Seabury's air-tight aseptic containers, plaster of paris bandages, "B. W. B." bandages, first-aid packets, etc.

As an addition to this section there was an exhibition of scientific apparatus and instruments, scientific preparations, and natural history specimens, specially prepared for the occasion by George Lagai, M. D., New York, in which skeletons were so articulated that the principal bones could be taken out for special demonstration and be replaced in position without difficulty. The stuffed specimens were prepared for the special purpose of showing true positions, natural poses, surroundings, etc. The section of this latter exhibit which was devoted to dissected and injected specimens of North American reptiles, batrachians, fishes, and marine invertebrates was prepared with a view of demonstrating modern methods of preserving the natural color and form of specimens by use of solutions of formaldehyde, and the methods employed in the United States of preparing natural history specimens for museums, schools, colleges, and general student research. The exhibit also included a general selection of North American insects.

Surgeons' rubber gloves, mittens and finger cots were exhibited by the Miller Rubber Manufacturing Company, of Akron, Ohio. The textile elasticity, weight, and superior quality of these necessary adjuncts to surgical operating work, as displayed in this exhibit, attracted considerable attention, the exhibit being purchased at the end of the Exposition for use in French hospital work.

A. A. Marks, New York, made the installation of artificial limbs, rubber feet and hands. The goods displayed were made for actual use, and attracted a great deal of attention from visitors. The exhibitor was awarded the only grand prize given to the United States in this class. This exhibitor received a large number of orders for artificial hands and limbs during the course of the Exposition. The exhibition of crutches was made by the New England Crutch Company, New York.

W. L. Marks and George F. Marks made the exhibits of special clamp buckles for surgical appliances, invalid chairs, and knife and fork in combination for use by persons temporarily or permanently disabled in one hand, the latter being so constructed that slight pressure on the side of the handle opened the blade ready for use.

The Banning Orthopedic and Mechanical Therapeutic Company, Fort Wayne, Ind., demonstrated methods of correcting deformities and malpositions of the internal organs of the human trunk by exhibiting appliances attached to lay figures, while the Rorick Air Cushion Truss Company, Washington, D. C., made the installation of air-cushion trusses and abdominal supports.

The general exhibition of dental chairs, engines, artificial teeth, fitting materials, and dental instruments and general supplies was made by Gideon Sibley, of Philadelphia. The exhibits of artificial teeth, filling materials, and instruments and goods of that class were displayed in cases which formed the outer lines of the space of this exhibitor. Dental chairs were shown in operative form in the center of the space, also in all-glass cases. The Gideon Sibley exhibit of dental apparatus, furniture, and dentists' materials and supplies was not only the most complete exhibit of its character at the Exposition, but it was also the most attractive one of its class, and did much, through the high merit of the materials displayed and the intelligent manner employed in demonstrating their uses, to further emphasize the fact that the United States not only leads the world in the theory and practice of this profession, but also in the design and production of all essential accessories belonging thereto; while the merit of the articles displayed reflected the long and favorable standing of the exhibitor in the United States.

The Ritter Dental Manufacturing Company, Rochester, N. Y., and the Harvard Company, Canton, Ohio, also made exhibits of dental chairs, dental engines, cabinets, and general dental furniture.

The exhibitions of prosthetic dentistry were confined to those of J. H. Meyer, D. D. S., New York; Franklin D. Kelly, Peoria, Ill., and specimens from the College of Dental Surgery, Chicago; the dental departments of the University of California, San Francisco; Western Reserve University, Cleveland; the University of Pennsylvania, Philadelphia; Vanderbilt University, Nashville, Tenn., and the Dental College of Pennsylvania, Philadelphia. The latter exhibits were under the general direction of the National Institute of Dental Pedagogy of America. Victor H. Jackson, M. D., D. D. S., installed one of the most interesting features of this section, which consisted of models exemplifying a system of correcting irregularities of the teeth and deformities of the jaw, and demonstrating the practice of orthodontia. This was the only exhibit of its character in the entire Exposition which showed a complete system of this branch of dental surgery.

CLASS 17.—*Musical instruments.*

MATERIALS, PROCESSES, AND PRODUCTS.

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits belonging to this class were installed in spaces numbered 5, 19, 21, 22, 24, 49, 50, 51, 52, 60, 65, and 66. The wall area in the rear of spaces 60, 61, and 62 were devoted to the exhibition of material and parts used in the construction of pianofortes and organs. One concert grand and one upright piano were installed in the national pavilion; one upright piano in the publishers' office; publishers' building, and one in the office of the liberal-arts section.]

The exhibition of materials used in the manufacture of musical instruments, and of designs for the casings and furnishings of such instruments, was both attractive and industrially educational. In this

class the exhibitors, together with the character of the individual display made by each, were as follows: The American Steel and Wire Company, New York, steel wire musical instrument strings; the American Felt Company, Dolgeville, N. Y., felts for musical instruments; the Art Joinery (Charles Dannenfelser), Cincinnati, workmanship in wood; Clement J. Barnhorn, Cincinnati, designs and carvings for piano cases; Brown & Patterson, Brooklyn, piano plates; C. H. Burton & Co., Cincinnati, veneers and cabinet woods used in construction of pianos and organs; the Chicago Brass Company, Chicago, reeds and reed boards for cabinet organs; Comstock, Cheney & Co., Ivoryton, Conn., upright piano action, keys and keyboard; William H. Fry, Cincinnati, specimens of carving for pianofortes; P. E. Guerin, New York, gilt and bronze ornaments for piano cases; Thomas J. Hall, Cincinnati, specimens of joinery construction for grand piano cases; the O. S. Kelly Company, Springfield, Ohio, piano-plate casting; Clarence E. Kerr, Cincinnati, workmanship in grand and upright piano sounding-boards; John W. Macy, Cincinnati, general plan of construction for pianos; Horace Moran, New York, original design of case for upright pianos; Piano and Organ Supply Company, Chicago, keyboards for organs; Pratt, Reed & Co., Deep River, Conn., piano keys; T. Shriver & Co., New York, grand piano plate castings; A. J. Sorenson, Chicago, designs for cabinet organs and plan of construction for case work; the Staib-Abendschein Company, New York, actions for upright pianos and model thereof; Strauch Brothers, New York, piano actions and keys; Wickham, Chapman & Co., Springfield, Ohio, iron plates for upright piano construction.

The foregoing exhibits well represented the various branches of the musical-instrument industry as it exists in the United States. They were displayed for the most part in the finished instruments, and were included in the exhibit which had been planned and arranged to represent the piano and organ manufacturing industry of the United States in all its phases, an exhibit which was intended to expose to the world not only all the materials but our modern methods of handling them and of constructing and finishing pianos and organs, and yet be an exhibit that would meet the requirements of the French classification.

The exhibition of processes and finished instruments was made by the Baldwin Piano Company, Cincinnati (grand and upright pianofortes and parts thereof); D. H. Baldwin & Co., Cincinnati (methods of manufacture and transportation, illustrated by models of the Baldwin factories in Cincinnati). This exhibit, on wall space, consisted of sections of parts and samples of material illustrating the entire make-up of an artistic piano. The Baldwin exhibit, which showed models of the Cincinnati factories, was located physically in the space of Group VI, class 28, department of civil engineering and transportation, owing

to the lack of sufficient space in the regular musical-instrument section in Group III. While the actual physical location of these models somewhat marred the complete sequence of the exhibit, they nevertheless thoroughly illustrated the American method of pianoforte production. The models consisted of a truthful reproduction to actual scale of the Baldwin Piano Company's and the Ellington Piano Company's factories in Cincinnati, and showed in detail railway facilities, machinery, tools, and artisans, and the work in process throughout the entire establishments. The models were lighted by electricity and in part operated by electricity. They were accompanied by architectural plans and drawings showing the details of mill construction, slow combustion, automatic sprinkling, and exhaust steam-heat systems as employed in modern American factory practice. The methods of manufacture were further illustrated by a series of large artificial-light photographs of the different departments of the factory as seen in actual operation. The exhibit as a whole illustrated the American adaptation of engineering and architectural skill to the problem of manufacturing with economy and dispatch, and showed the system whereby the material was received, passed through the various processes of manufacture, and also the shipment and distribution of the finished product with the greatest economy. The factories were constructed upon a scale of one-half inch to the foot and were exact representations of the existing plant. The equipment consisted of the woodworking machinery, the material in process, all upon the same scale of one-half inch to the foot and carried out fully in every detail. Trucks, racks, benches, tables, and labor-saving devices of various kinds were reproduced. Figures faithfully representing the 450 workmen employed were placed in the proper positions. The iron plates, the frames, and the different parts of pianos were reproduced in the material actually used and placed in the department where they properly belong in the operation of the factory. The electric generators and motors used for power in various parts of the factory were represented; the elevators in use were reproduced and operated. The American type of box and platform cars were exactly reproduced and shown, as was also the American switching locomotive, the locomotive being operated by electricity and handling the cars. The lumber yard was shown, with the lumber piled according to the American system. The dry houses were filled with dimension material. The factories were lighted by electricity. The entire scheme as carried out illustrated the requirements of the French classification as to the processes of manufacture, and, as an exhibit in the engineering section, illustrated the application of transportation problems both in and out of the factory in the economical production of pianos. These exhibits of materials and models were carefully studied and apparently highly appreciated by many, if not all, piano manufacturers who visited the Exposition.

Many of these manufacturers, especially those located in Europe, found these two displays alone of sufficient importance and interest to cause them to send their factory superintendents and artisans to study the exhibits in detail.

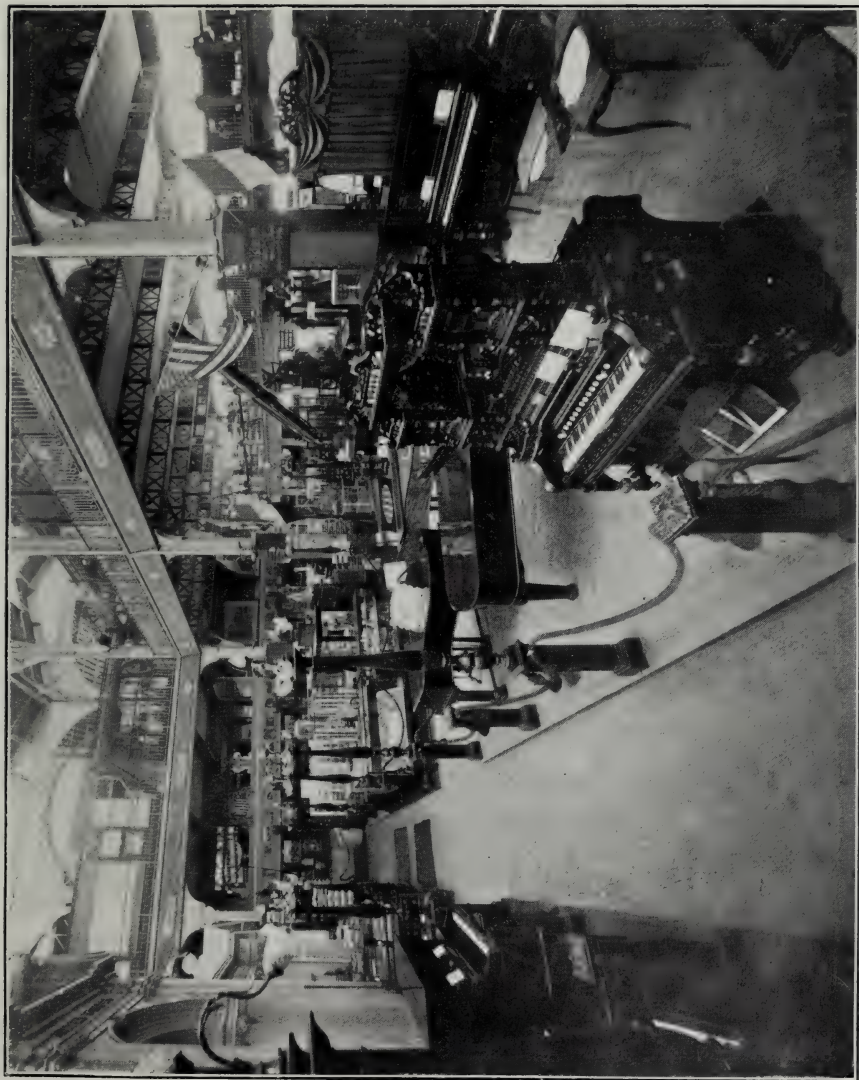
The exhibit of finished instruments made by the Baldwin Piano Company consisted of grand and upright pianos, giving a wide range of styles in exterior designs, and all made of the choicest variety of woods. In the musical-instrument section in the space of Group III this company exhibited one concert grand piano in dark mahogany; one parlor grand, style Louis XVI, in white mahogany; one parlor grand, style renaissance, in light Santo Domingo mahogany; one upright, style Empire, in mahogany; one upright, style Art Nouveau, in Ohio walnut; one upright, style Colonial, in dark mahogany; one upright, style known as "No. 53" (renaissance), in mahogany. In the façade directly in front of the regular musical-instrument section the Baldwin Piano Company installed one parlor grand, American style, in mahogany; one upright in satinwood, one upright in figured walnut, one upright in mahogany. In the United States Pavilion, in the Street of All Nations, the Baldwin Company placed one fine grand concert piano in mahogany and one of its Empire style of upright pianos in dark mahogany. This grand piano was used during the Exposition at all concerts, banquets, and receptions given in the United States National Pavilion. The Baldwin Company also placed one of its upright pianos, in light mahogany, in the general office in the publishers' building and another in the general office in the entresol of the liberal arts department. The latter instrument was an upright of Colonial style in Santo Domingo mahogany.

The exhibit of the Hamilton Organ Company, Chicago, which is one of the branch manufacturing divisions of the Baldwin Company, consisted of four cabinet organs and two upright pianos, as well as of the different parts of an organ, separately displayed on wall space.

The entire exhibit of the Baldwin Piano Company, except two concert grand and three upright pianos, which were expressly withdrawn, was sold to connoisseurs. The exhibit of the Hamilton Organ Company was sold more than twenty times over during the period of the Exposition, to be shipped to different countries of the world.

During the Exposition this company was represented by Mr. Lucien Wulsin, its president, and Mr. J. W. Macy, superintendent of factories, with Mr. Somlyo and Assistants Jones and Mitchell in charge of exhibits, while Mr. Frantz was the mechanician, with Mr. Chenet as his assistant.

In appreciation of the comprehensive, artistic, and magnificent exhibit made by the Baldwin interests, the international juries gave the following awards: To the Baldwin Piano Company, one grand prize; to J. W. Macy, superintendent of the Baldwin factories, one



C-4. LOOKING SOUTH, REAR OF FAÇADE, LIBERAL ARTS SECTION, CHAMP DE MARS.



MODEL OF THE BALDWIN AND ELLINGTON PIANO FACTORIES, CINCINNATI, OHIO.

gold medal, with the addition of five bronze medals to collaborators, employees, and workmen of the Baldwin Company; to the Hamilton Organ Company, one silver medal; to Mr. A. J. Sorenson, factory superintendent, one bronze medal, and five awards of honorable mention to collaborators, employees, and workmen of the Hamilton Organ Company; to D. H. Baldwin & Co., for its exhibit of models of factory, etc., one silver medal; to Messrs. Elzner & Anderson, architects, one bronze medal, and one bronze medal to Charles Dannenfelser for wood construction.

The above constitutes the broadest and most sweeping recognition that has ever been accorded any United States piano manufacturer at any previous international exposition. At the Paris Exposition of 1867, such well-known United States manufacturers as Steinway & Sons, Chickering & Sons, and Mason & Hamlin made exhibits. The former two received awards of gold medals on pianos, and the latter an award of silver medal on harmoniums. At the Paris Exposition of 1878 the Messrs. Stieff, C. Meyer, Schaeffer, Mason & Hamlin, Clough & Warren, and B. Schoninger made exhibits. Mason & Hamlin received an award of gold medal for harmoniums on that occasion, while all the others received awards of a lower grade. At the Paris Exposition of 1889 Albert Weber received a silver medal for the exhibition of grand and upright pianos. At the Paris Exposition of 1900 the Baldwin Piano Company was awarded a grand prize on grand and upright pianos, and its collaborating employees one gold and five bronze medals. In this connection perhaps no better understanding can be had of the general plan and scope originally outlined for this section, its execution and attendant results, than may be obtained from the language used by the president of the Baldwin Piano Company in a letter addressed to the head of this department, under date of January 11, 1901, and quoted literally below:

I would respectfully call your attention to the fact that the success of these exhibits of our organizations, prepared under your general instructions, has been unequalled in any previous expositions. The interest of the exhibit was such that, not only from the press of France, England, and Germany, but by the testimony of the great manufacturers and the workmen and superintendents which they sent to study the exhibits, there was a universal agreement that as an object lesson and illustration of the industry in the United States it has not at any time been equaled, and that it possessed the greatest interest and value.

As I understood your desire and your ideal in the representation of the manufacturing industry in the United States, in view of limited space at your command for the illustration of an industry which represents a yearly output of 150,000 pianos and 100,000 cabinet organs of the combined value of and for which the people of the United States expend \$50,000,000 annually, you desired to show not only the highest quality, but also the business organization which has secured such great results, and further to illustrate the development of an industry in the United States west of the Alleghenies which has occurred almost entirely since the Paris Exposition of 1889. In that decade an industry has been developed which produces 60 per cent of the pianos and organs made in the United States.

Our house, therefore, represented this Western manufacturing development, the Hamilton Organ Company having been started in 1889 and the Baldwin factory in 1890, though the foundation of the house itself—D. H. Baldwin & Co.—dates from 1862.

Your selection of our house, therefore, illustrated every phase of the American piano and organ industry and distribution, and the awards secured testify to the soundness of your judgment as well as to the merit of our exhibits.

I can not close this report to you without again expressing my personal thanks and those of my associates in business for the constant official and personal courtesy which we have received from you in the discharge of your official duties.

We also wish to acknowledge our indebtedness and thanks to the Commissioner-General of the United States and the heads of his departments with whom we came in contact, and to express our highest appreciation of the thoroughness of the American organization, the devoted attention which it was enabled to give and did give personally to the interests of the American exhibitors in this great world competition.

Yours, respectfully,

LUCIEN WULSIN,
FOR THE BALDWIN PIANO Co.
THE ELLINGTON PIANO Co.
THE HAMILTON ORGAN Co.
D. H. BALDWIN & Co.

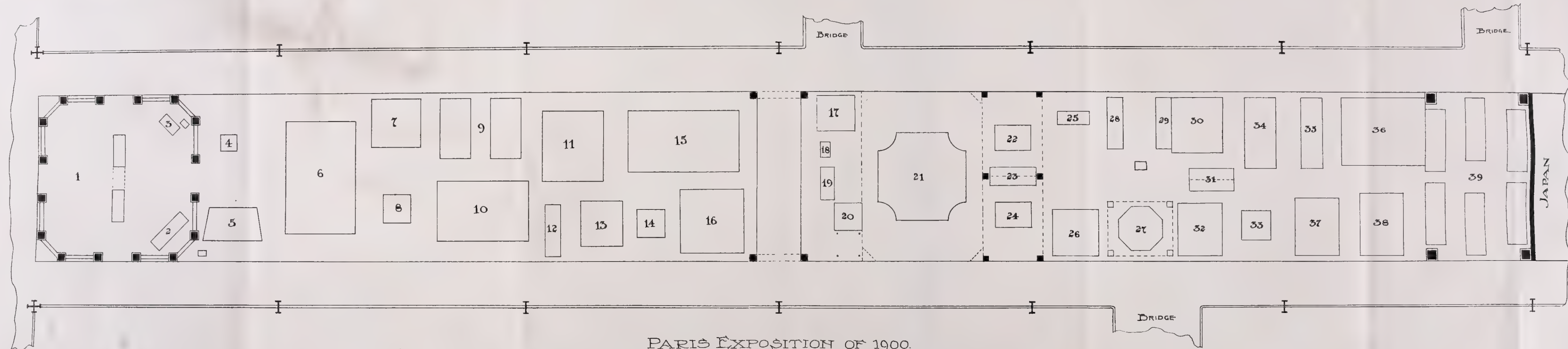
The exhibition of self-playing pianos and attachments was made by the Adek Manufacturing Company and Messrs. Ludwig & Co., both of New York, the latter also exhibiting upright pianos. The general exhibit of stringed and vibrating instruments was made by Joseph Bohman, of Chicago, and was augmented by the exhibits of Icilio Consalvi, Boston (specially made banjo claimed to consist of 39,987 pieces); the Flagg Manufacturing Company, of Boston, zithers and harps; Angelo Mannello, New York, mandolins and guitars; Knuit Reindahl, Chicago, with a quartet of violins. The Columbia Phonograph Company, New York, and the American Graphophone Company, Bridgeport, Conn., made both a retrospective and contemporaneous exhibit of phonographs, graphophones, and supplies therefor. These latter two companies were honored with an award of grand prize.

CLASS 18.—*Theatrical appliances and equipment.*

[See plan of installation, ground floor, Group III, Champ de Mars. Exhibits belonging to this class were installed in spaces numbered (furniture) in the south bay of the entresol and on spaces numbered 77, the high wall space over spaces 79, 80, and 81; also see plan of installation, agricultural annex, Camp de Mars.]

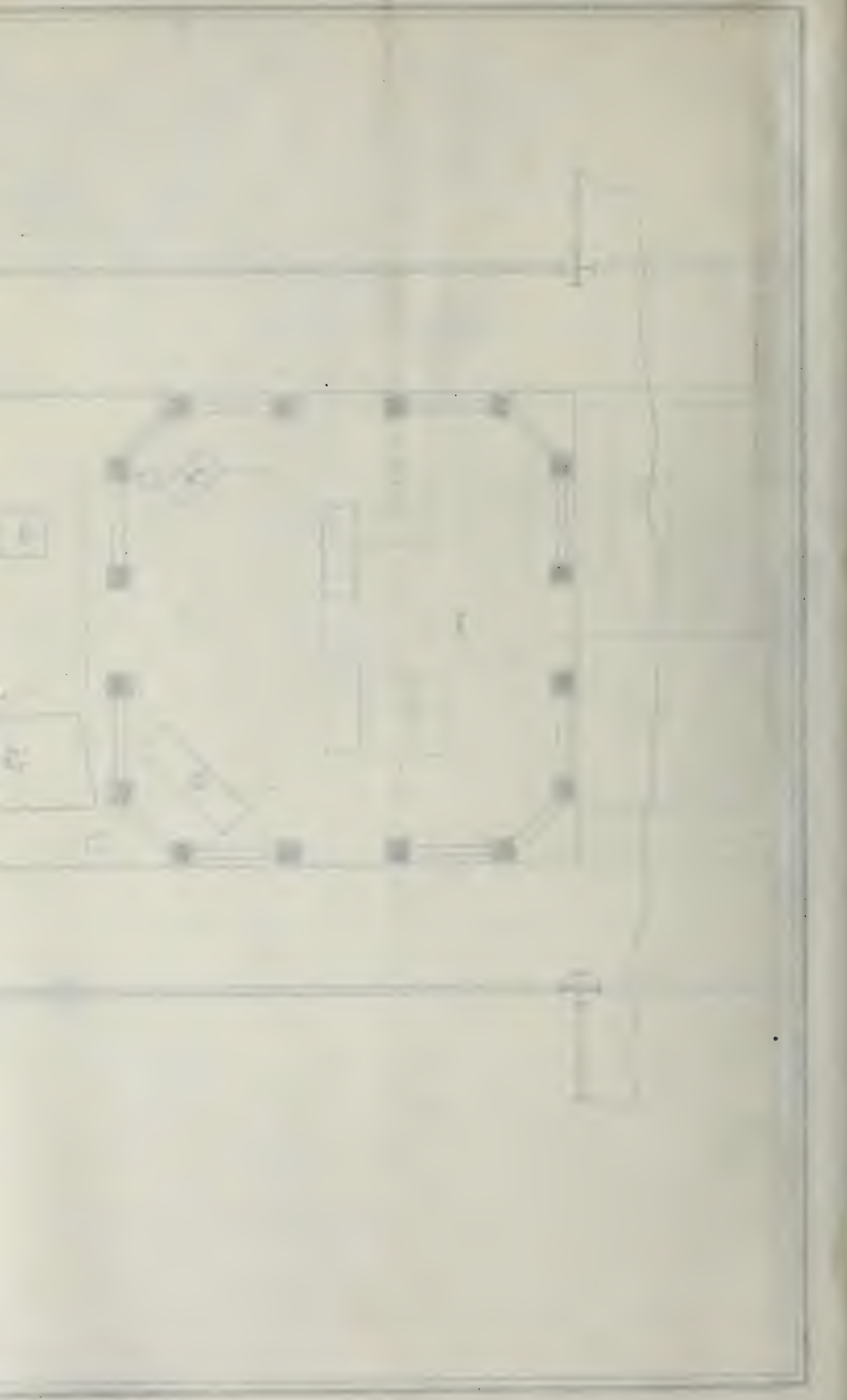
The United States and France were practically exclusive exhibitors in this class, and the United States was the only foreign country accorded membership in the international jury on theatrical appliances and equipment.

The United States exhibit was contributed by the Chicago Auditorium Association, Chicago; Joseph Byron, New York; and the A. H. Andrews Company, Chicago, and consisted of exterior and interior views of the Chicago Auditorium, opera-house furniture by the Andrews Company, and a series of artificial-light photographs of stage scenes in well-known American theaters, taken by Joseph Byron during the production of various acts in standard or popular plays. The principal scene shown by the Auditorium Association was the



PARIS EXPOSITION OF 1900.
 PLAN OF INSTALLATION IN UNITED STATES SPACE.
 FIRST FLOOR PALACE OF CHEMICAL INDUSTRIES.
 GROUP XIV.

0 5 10 15
 Scale of Feet.



original flashlight photograph of the "Chicago Day" banquet tendered to President McKinley, his staff, and guests October 9, 1899. This single plate artificial-light photograph measured 26 by 38 inches, and included a view of the entire stage, proscenium, parquet, and boxes of the Auditorium, and the faces of over 800 persons. This photograph, enlarged and reproduced in life colors, was also exhibited. All exhibits in this class, except the opera-house furniture, occupied wall space in the liberal arts section.

CHEMICAL INDUSTRIES SECTION.

KEY TO INSTALLATION.

[See plan of installation of Group XIV, Champ de Mars.]

1. Shaving and toilet soaps. The J. B. Williams Company, Glastonbury, Conn.
2. Phenol preparations. The Antikamina Company, St. Louis.
3. Coke Dandruff Cure. The A. R. Bremer Company, Chicago.
4. Barbers' furniture. Theo. A. Kochs Company, Chicago.
5. Gelatines. The Michigan Carbon Works, Detroit.
6. Basic salts; general chemicals. The Thomsen Chemical Company, Baltimore.
7. Machinery oils. Leonard & Ellis, New York.
8. Listerine. Lambert Pharmacal Company, St. Louis.
9. Manufactured tobaccos. Henry Clay & Bock & Co., New York.
10. Pharmaceutical products. Wm. R. Warner & Co., Philadelphia.
11. Medical and surgical plasters, etc. Seabury & Johnson, New York.
12. Medical preparations. The Drevet Manufacturing Company, New York.
13. Decorative materials. The Muralo Company, New York.
14. Bromidia and ethol preparations. Battle & Co., St. Louis.
15. Perfumery and toilet soaps. Colgate & Co., New York.
16. Aquarine paint. Muzzy Bros., Paterson, N. J.
17. Essential oils. The Hotchkiss International Prize Medal Essential Oil Company, Lyons, N. Y.
18. Metal polish. Universal Silver Polish Company, Denver.
19. White lead. Wm. J. Matheson & Co., New York.
20. Fish glues. Russia Cement Company, Gloucester, Mass.
21. Soaps, glycerines, etc. B. T. Babbitt, New York.
- 22 and 23. Cachous and chewing gum. The Sen-Sen Company, New York.
- 23 and 24. Effervescent Carlsbad salts. S. Kutnow & Bro., New York.
25. Glazed kid (leather). F. J. Blatz & Bro., Elizabeth, N. J.
26. Patent leather. Woodside Patent Calf Manufacturing Company, Newark, N. J.
27. Leather oils. Vacuum Oil Company, Rochester, N. Y.
28. Shoe polishes. P. A. Blichert Manufacturing Company, Chicago.
29. Perfumes, toilet soaps, cream of lemon. The California State Commission.
30. Black pigments. Binney & Smith, New York.
31. Storage box and lounge. Department Chemical Industries.
32. Glazed kids (leather). Dungan, Hood & Co., Philadelphia.
33. Metal polish (Putz cream). The American Supply Company, New York.
34. Varnishes and colors. Valentine & Co., New York.
35. Manufactured leathers. Wagner Leather Company, Stockton, Cal.
36. Heavy leathers. Leas & McVitty, Philadelphia.
37. Vici kid (leather). Robert Foederer, Philadelphia.
38. Glazed chrome kids (leather). Oscar Scherer & Bro., New York.
39. By-products of petroleum. Standard Oil Company, New York.

CHEMICAL INDUSTRY APPARATUS AND MACHINERY.

[See plan of installation, Group VI, Champ de Mars.]

24. Pharmaceutical machinery. Dr. D. Genesee, Baltimore.
25. Leather staking machine. Vaughn Machine Company, Boston. This space also used for storage of printed matter of exhibitors in the department of liberal arts and chemical industries.
26. Cigar and cigarette machinery. The Miller, Du Brul & Peters Manufacturing Company, Cincinnati.
27. Decalcomania products. The Meyercord Company, Chicago.
28. Coke Dandruff Cure. A. R. Bremer Company, Chicago.
29. Phonographs and graphophones. Columbia Phonograph Company and American Graphophone Company, New York.
30. Cigar-making machinery. Otto Cytron, Los Angeles.
31. Leather staking machine. F. F. Slocomb & Co., Wilmington, Del.
32. Sanitary stills. The Cuprigraph Company, Chicago.
33. Pharmaceutical and chemical machinery. The William Freck Company, Chicago.

CHEMICAL INDUSTRIES

[Group XIV.]

[See plan of installation, Group XIV, Champ de Mars; plan of installation, Group VI, Champ de Mars, and plan of installation, publishers' building, Esplanade des Invalides. Exhibits belonging to Group XIV were installed in spaces 1 to 39, inclusive, chemical industries section, Champ de Mars; spaces 24 to 33, inclusive, civil engineering and transportation section, Champ de Mars, and space No. 20, publishers' building, Esplanade des Invalides.]

The chemical industry exhibit of the United States was divided into two sections, one of which occupied a central gallery in the southeast end of the palace of chemical industries, Group XIV, and the other a portion of the space allotted to the United States department of transportation, Group VI, both in the Champ de Mars.

The space in that of Group VI which was eventually transferred to this department for the installation of chemical apparatus and machinery, though comprising 1,887 square feet as an allotment to the United States, was greatly diminished in value for exhibition purposes by an escalator which, with its obligatory circulation, was located near the center of the area. Although but 333 square feet of this space was actually consumed in subsidiary circulation in front of exhibits, the contour of the space, together with the peculiar location of the escalator, made about one-third of the net exhibit area unavailable for effective installation. Consequently most of that portion of the space south of the escalator was used for the storage of printed matter belonging to exhibitors in the department of liberal arts and chemical industries.

It had been decided not to attempt to make any displays of chemical apparatus or machinery, owing to the fact that no ground floor space had been allotted to the United States for exhibits of this character classified in Group XIV, and because the gallery where the regular



C-11. CHEMICAL INDUSTRIES SECTION, CHAMP DE MARS, LOOKING NORTHWEST, SHOWING BOOTH PAVILION AT SOUTH END AND ARCH AND TOWER AT CENTER OF SECTION.

chemical industries section was located would not sustain moving machinery, neither was it supplied with necessary power, water, and sewerage service. Great Britain, in the latter part of 1899, relinquished a small amount of space on the north end of the United States civil engineering and transportation section and this space was then re-assigned to the United States by the French authorities. This made it possible (after all space in both the regular chemical industries and civil engineering and transportation sections had been allotted to exhibitors and plans of installation adopted) to move the entire installation of Group VI north the distance that represented the frontage of Great Britain's surrendered space and thus to provide for the exhibition of a limited number of machines used in the chemical arts.

The regular chemical industries section in the main gallery of the palace of chemical industries covered an area 19 feet 8½ inches wide by 171 feet 6 inches long net. The full width of the gallery was 29 feet 6½ inches and carried an aisle of 5 feet 6 inches wide on each side, with an aisle 9 feet wide between it and the Belgian section at one end and a partition separating it from the Japanese section at the other end. A platform 4 inches high covered the floor of the section except at the center, where there was a passageway 5 feet 6 inches wide, marked at each end by two columns supporting an arch surmounted by a gilded eagle, the face of the arch bearing the title of the section. From each side there were aisles leading into the section, thus connecting it with the other gallery spaces and permitting of free access from the sections of Hungary, Spain, Holland, Norway, Denmark, and Roumania. The floors of the entire section and adjoining aisles were covered with linoleum. While it was not intended, owing to the diversity of the products exhibited, to preserve harmony in color and shapes of exhibit cases, yet a symmetrical appearance was given to the section by the similar beautiful façades at each end, the large tower exhibit in the center, and the vitrines between.

The façade at the east end of the section was constructed by the exhibitors occupying the area it covered. It was octagonal in form, in gold and white coloring, covered an area practically 20 by 20 feet, and had a balustrade 2 feet 6 inches in height above the platform and a total height of 13 feet 6 inches, with an entrance on four sides. It was capped by a conical construction of cloth, bearing at the top a gilded eagle and at each corner the French and United States pennants. The panels of the façade displayed the names and addresses of the exhibitors beneath. The columns and capping were decorated with flambeaux, eagles, and United States shields in the tricolor. By utilizing the space on the balustrade between the columns, exhibitors were able to install four small show cases and one tall octagonal vitrine. In the center of the pavilion they placed two large vitrines connected by a graceful arch. All of these cases were artistic

in style and finish and colored in white and gold, with light-green lettering in conformity with the façade. A sofa, writing table, washstand, chairs, and rug constituted conveniences that were extensively patronized.

During the Exposition the J. B. Williams Company, occupying the front of this pavilion, gave away 200,000 attractive pamphlets—25,000 in German, 25,000 in English, and 150,000 in French—and also distributed at the booth 48,000 samples of shaving soap and 1,600 of toilet soap, especially made for the Exposition. Some of these samples were distributed in person by Mr. J. B. Williams, who first manufactured the product exhibited in the United States over sixty years ago.

While the east end of this section was conspicuously marked by this booth pavilion or façade, the west end was similarly terminated by the construction and exhibit of the Standard Oil Company. This construction covered an area of 12 feet by 19 feet $8\frac{1}{4}$ inches and consisted of four square columns connected above by arches, each of which bore in the center a large eagle. Flambeaux, eagles, and tricolor shields adorned the columns, and the whole was finished in white and gold, in conformity with the other façade. As there was no balustrade, the public had free access from all sides. This façade did not show off to the best advantage because it was concealed on one side by the French arbitrary partition that separated the section from that of Japan and on two corners by the clumsy and inartistic French section signs. Within the façade were six large well-designed vitrines, glass on all sides, containing the most extensive collection of crude oils and oil-bearing rocks ever exhibited. The crude petroleums were collected from all parts of the world. There were also a complete series of the products derived from petroleum, while in one case there was exhibited the individual hydrocarbons obtained from various crude petroleums from Ohio, Indiana, Pennsylvania, Canada, and Japan. The collection represented about fifteen years of research by Professor Mabery, of the Case School of Applied Sciences, Cleveland, Ohio, aided by some twenty assistants at various times. The work was carried on under the Warren fund. It was the largest collection of pure derivatives of petroleum ever made and was valued at \$10,000. The Standard Oil Company was awarded a grand prize for this exhibit.

While these two façades marked the ends of the section, the center was brought out conspicuously by the large tower erected by the B. T. Babbitt Company, requiring twenty-seven days' work for its construction. In the two divisions of the section formed by these booth pavilions there were scattered at irregular intervals the various installations and vitrines of different sizes, shapes, and colors. It was this irregularity that made the section one of the most attractive in the palace of chemical industries, for they were so arranged as to give alternation of dark and light coloring and diversity of view to the vis-



C-12. CHEMICAL INDUSTRIES SECTION, CHAMP DE MARS, LOOKING SOUTHEAST AND SHOWING BOOTH PAVILION AT NORTH END AND TOWER AT CENTER OF SECTION.

itor. The largest of these vitrines was that of the Thomsen Chemical Company, of Baltimore. The Thomsen exhibit consisted of immense flasks of the salts of copper, iron, zinc, etc., and of smaller vessels containing specimens of the various common salts and acids, and a mass exhibit of crystallized sodium phosphate. The jury criticised the iron carbonate and the soluble sodium chloride because they were not perfectly clear.

The vitrine of Colgate & Co., of New York, contained an artistic arrangement of perfumes, toilet soaps, toilet water, sachet powders, and shaving soaps. This exhibit was the most important of its character in the section and received an award of grand prize.

The California State Commission installed and cared for the exhibits of Paul Reiger, perfumer; Cream of Lemon Company, cosmetics; Webb's toilet soaps, and the Wagner Leather Company, all having come from California.

Ten manufacturers represented the pharmaceutical industries of the United States, the more important among them being Seabury & Johnson, New York, and Wm. R. Warner & Co., the latter donating their exhibit to a Paris hospital at the close of the Exposition.

The pharmaceutical machinery consisted of hand machines for the manufacture of suppositories and tablets of varying sizes and composition, made by Dr. Genese, of Baltimore. The most striking features of this exhibit were machines for making a 95 per cent glycerin suppository, carbolated cocaine, and tin foil one one-thousandth of an inch thick for hermetically sealing chemical compounds.

The other exhibit of pharmaceutical machinery, made by The Wm. Freck Company, of Chicago, comprised both hand and power machines for making, simultaneously, from one to six lozenges, tablets, suppositories, and bougies (both hollow and solid), in sizes varying from one-tenth of an inch to 1 inch and in all shapes required for pharmaceutical purposes. These machines are also used by confectioners and for compressing water-color tablets from the powder instead of the paste, as formerly. There were 23 different hand machines exhibited, and with each machine was exhibited its product and the accessories for changing the size, shape, and number of tablets to be produced.

In oils and varnishes, besides the large exhibit of the Standard Oil Company, there were exhibitions by Valentine & Co., of New York; the Vacuum Oil Company, of Rochester, N. Y., and Leonard & Ellis, of New York. Out of 240 carriages exhibited in the French section, 130 were coated with Valentine's varnishes.

The Vacuum Oil Company had four exhibits at the Exposition, one in this section, one in Group IV and V, a large one at Vincennes, and a very artistic separate pavilion in the Champ de Mars. This company furnished a large percentage of the lubricating oils used at the Exposition.

There were four exhibits of paints, made by Binney & Smith, New York; the Matheson White Lead Company, New York; the Muralo Decorative Company, New Brighton, N. Y., and Muzzy Brothers, Paterson, N. J. Binney & Smith exhibited petroleum blacks for use in making electric carbons and demonstrated the fineness and uniformity of the product by means of lithographic and typographic specimens. The firm also exhibited a specially fine black that is used in half-tone inks and special inks of various kinds, for soft lithographic crayons, and in the tinting of papers.

The industry most extensively represented in this section was that of leather. Most of the exhibiting houses had been represented in Paris for a number of years, as American leathers are extensively exported to France, except sole leather and belt leather, on which there is a prohibitive tariff at present. A grand prize in this class was given Robert Foederer, of Philadelphia, who exhibited the well-known Vici kid. The exhibit of Oscar Scherer & Bro., New York, received a gold medal. Dungan, Hood & Co., Philadelphia, made a simple exhibit of glazed kids in black, brown, and blue and received a gold-medal award.

Theodore A. Blatz, New York; The Woodside Patent Calf Manufacturing Company, Newark, N. J., and Leas & McVitty, Philadelphia, the latter including collectively the exhibits of their own leathers together with those of Amos Hollinger, Howard Tannage, Green & Sons, and the Salem Tanning Company, made exhibits of manufactured leather.

F. F. Slocomb & Co., Wilmington, Del., exhibited two leather-working machines in operation.

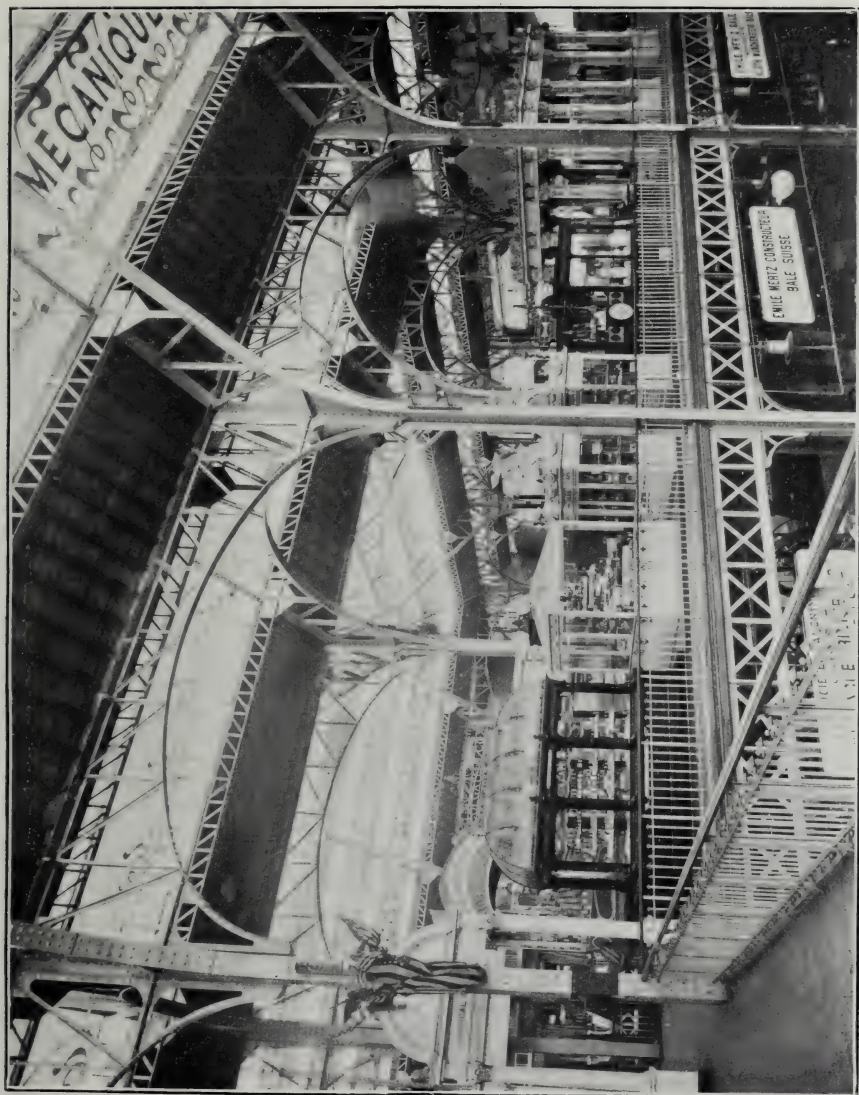
Gelatins and glues were represented by the Michigan Carbon Works, Detroit, and the Russia Cement Company, of Gloucester, Mass.

The Hotchkiss International Prize Medal Essential Oil Company, Lyons, N. Y., made the exhibit of essential oils.

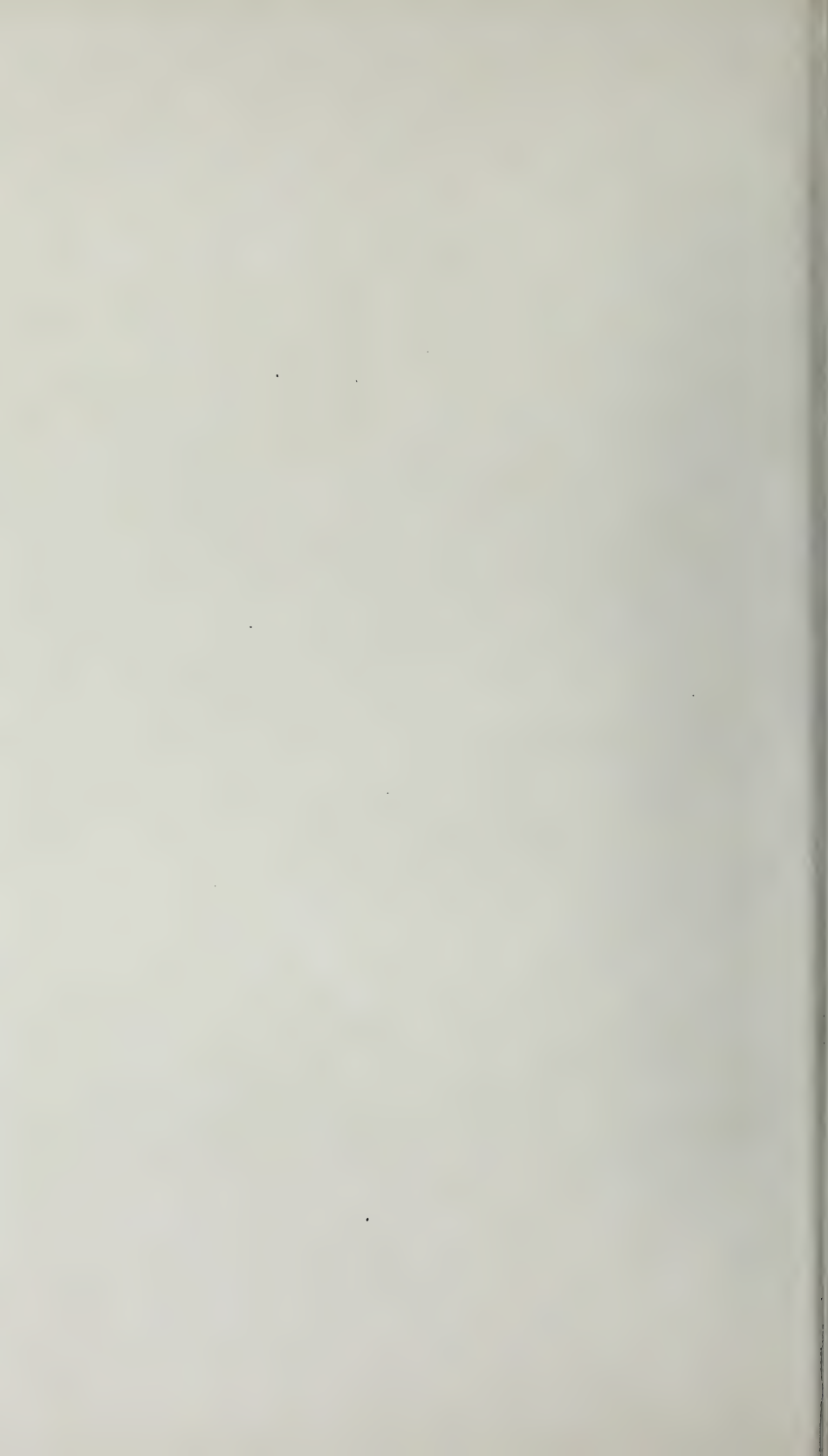
The exhibit of barbers' supplies was made by Theo. A. Kochs, Chicago.

The P. A. Blichert Manufacturing Company, Chicago, made the exhibit of shoe polishes. This exhibit had special importance from a commercial point of view, for while the French polishes are extensively sold in the United States, the French are equally anxious to obtain American polishes.

The exhibit of sanitary stills was made by the Cuprigraph Company, Chicago, consisting of stills so constructed as to aerate the water at the same time that it is being distilled. An exhibit in the same class was that of filters, by William Jandus, Cleveland, Ohio. The latter exhibit was installed in the publishers' building, owing to lack of water connections in the space Group XIV. The filters did effective work during the Exposition by furnishing thoroughly filtered water



C-13. CHEMICAL INDUSTRIES SECTION, CHAMP DE MARS, LOOKING EAST, SHOWING ARCHES AT CENTER OF SECTION.



to the employees of the publishers' building. The novelty of these filters consists of a metal cylinder in which is inclosed a carbon cylinder with corrugated sides and so arranged that the water is forced through the carbon. To prevent the accumulation of impurities on the inside of the filter there is a steel brush automatically rotated by the force of the running water.

The manufactured tobacco industry was represented by the Miller, Du Brul & Peters Manufacturing Company, New York and Cincinnati; the Henry Clay & Bock & Co., Havana; Jacob Stahl, jr., & Co., and the Surbrug Company, New York. The first of these companies exhibited a complete collection of its tobacco machinery in actual operation, showing the various processes of making cigars and cigarettes. The exhibit was visited by many interested persons, and extensive sales were made.

The Henry Clay & Bock & Co. had a conspicuous and handsome exhibit of manufactured tobaccos, consisting of a large collection of different shapes and sizes of the very best cigars and cigarettes. This company and other Cuban manufacturers of tobacco also exhibited in the Cuban section.

A neatly arranged and attractive exhibit of bauxogen was donated to the section by Prof. Ernst Fahrig, chief of the laboratories of the Philadelphia Commercial Museums. Bauxogen is an amorphous aluminate which is of great use in the commercial laboratory for retaining chlorine, bromide, and ozone and for preparing substances that can not be obtained by other means. The exhibit was universally admired by scientific visitors, of whom there were very many, and there were numerous applications for information in regard to it. Bauxogen was exhibited purely for the scientific interest attached to it and did not enter into competition.

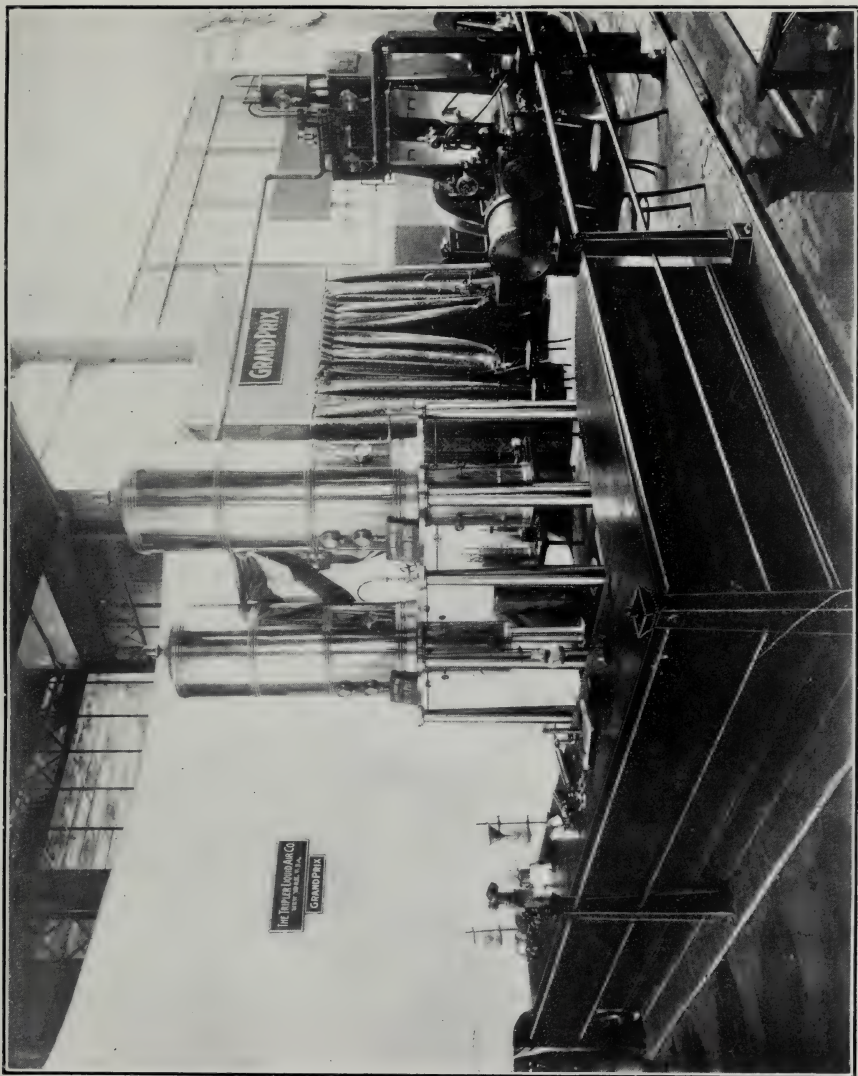
These exhibits had to be arranged with the greatest economy of space, owing to the limitations of the section; nevertheless, they were so placed that every display had an aisle frontage and there was free access throughout the section to all sides of the exhibit cases. The open style of installation here clearly demonstrated its advantage over other methods of exhibition. It was noticed during the whole Exposition that visitors took more pains to thoroughly inspect these various cases than they did in foreign sections, where the exhibits were otherwise arranged. It was also noticed that the United States section of chemical industries attracted larger crowds than any other section in the gallery.

Out of the 55 exhibitors, 18 had agencies in Paris before the Exposition, 8 had their goods on the Parisian market, 1 established a whole-sale agency, and 9 introduced their goods into France during and as a direct result of the Exposition.

One of the most attractive and interesting exhibits classified as a
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chemical process, and exhibited in the machinery section, was that of the Tripler Liquid Air Company, under the personal supervision of Prof. Charles Eastman Tripler. By means of a practical operative plant he demonstrated the self-intensive process of liquefying common atmospheric air for commercial purposes. The apparatus consisted of a 25-horsepower horizontal, four-stage compressor, in which the air was reduced by a pressure of about 2,500 pounds per square inch. There were two liquefiers which received the air from the compressors, each having a capacity, approximately, of 5 gallons of liquid air per hour. Within a very short time after starting the compressor the liquid air would begin to pass from the liquefiers into the receiving cans.

In connection with the liquefying plant there was exhibited a large butchers' ice box cooled by liquid air and a small model plant for refrigeration. As an example of the utility of liquid air for refrigeration and power in one process, the exhaust air, after cooling the ice box, was conducted to an air drill, which it operated in the same manner as when compressed air is used to drill holes in rocks. In the model refrigerator the liquid air was first placed in what is called the liquid-air boiler, where the heat of the surrounding atmosphere caused it to boil and evaporate, and the cool, evaporated air was then allowed to pass out through pipes into a large glass jar. The air passed around the inside of the glass jar in coils of pipe, and by the manipulation of two small valves the rapidity of the evaporation of the liquid air was controlled and the desired temperature maintained in the cold-storage room. The air, after passing through the pipes in the glass jar, where it had naturally absorbed considerable heat, of course expanded and generated power. The air was then conducted to an ordinary steam engine, which it operated by its expansive power in practically the same way that steam operates. When the air reached this point, having passed through several long coils of pipe in being conducted from the liquid-air boiler through the cold-storage jar to the engine, it had become warmed up to very nearly atmospheric temperature, and consequently had generated a power equivalent to about $5\frac{1}{2}$ horsepower hours per gallon of liquid air. The engine operated in this small plant was also used to drive a dynamo for producing several electric lights. The plant thus illustrated a method of utilizing liquid air, first for cold storage and then for power in cold-storage warehouses, hotels, or, on a small scale, in private residences. The exhaust from the engine was rich in oxygen, and the value of the oxygen for the reduction of metals was illustrated by placing a bar of steel in the exhaust from the engine, and upon touching a lighted taper to the steel it would burn fiercely, making a brilliant light, consuming the steel and actually oxidizing it. This and other experiments proved interesting to visitors and assisted in demonstrating a method for the control of this power for commercial purposes.



C-24. INSTALLATION OF LIQUID-AIR PLANT, MACHINERY BUILDING, CHAMP DE MARS. THE TRIPLER LIQUID AIR COMPANY.

The company also had in operation a small runabout automobile propelled by liquid air. The machine was capable of running a distance of about 50 miles with a single charge of liquid air, amounting to practically 10 gallons.

Among the other demonstrations were the application of liquid air to general refrigeration and as a motive power for propelling not only automobiles but various forms of engines that can be operated by steam or compressed air, and the utilization of the exhaust from the cold-storage apparatus or one of the engines for melting steel. These experiments created probably almost as much interest as the operation of the automobile, by reason of steel and other metals being fused by the application to them of a lighted match when the jet of air was turned on them, and illustrated the application of the condensed oxygen from liquid air in the reduction of metals and the manufacture of steel and iron. The experiment which perhaps attracted the greatest attention was the one of freezing mercury, in a mold in the form of a hammer, so hard that nails were driven with it; alcohol was also frozen. Numberless articles were immersed in the liquid air and frozen until they became brittle like glass. India rubber balls, tin cups and pans, after being immersed in the liquid air, became brittle and could be broken with the fingers. Vegetables and meats were frozen in the liquid air and pulverized while rendered brittle by the intense cold; steel pens and pieces of steel were also fused and melted by the application of a match in a glass tumbler partly filled with liquid air. A tumbler of liquid air, on being placed in a vessel of water, soon became incased around the outside with a thick layer of ice. Other demonstrations were made to illustrate the development of a temperature of about $3,500^{\circ}$ above zero in a vessel whose temperature 312° was below zero, showing extremely high and low degrees of heat in one and the same operation.

The United States exhibit of natural leaf tobaccos, although classified in Group XIV, was made by the Agricultural Department and located in the agricultural section. It was pronounced by those competent to judge to be the finest exhibit of this character ever brought together. It attracted a great deal of attention from experts and received the highest consideration at the hands of the jury of awards.

PUBLISHERS' BUILDING.

KEY TO INSTALLATION.

[See plan of installation, United States publishers' building, Group III, annex, Esplanade des Invalides.]

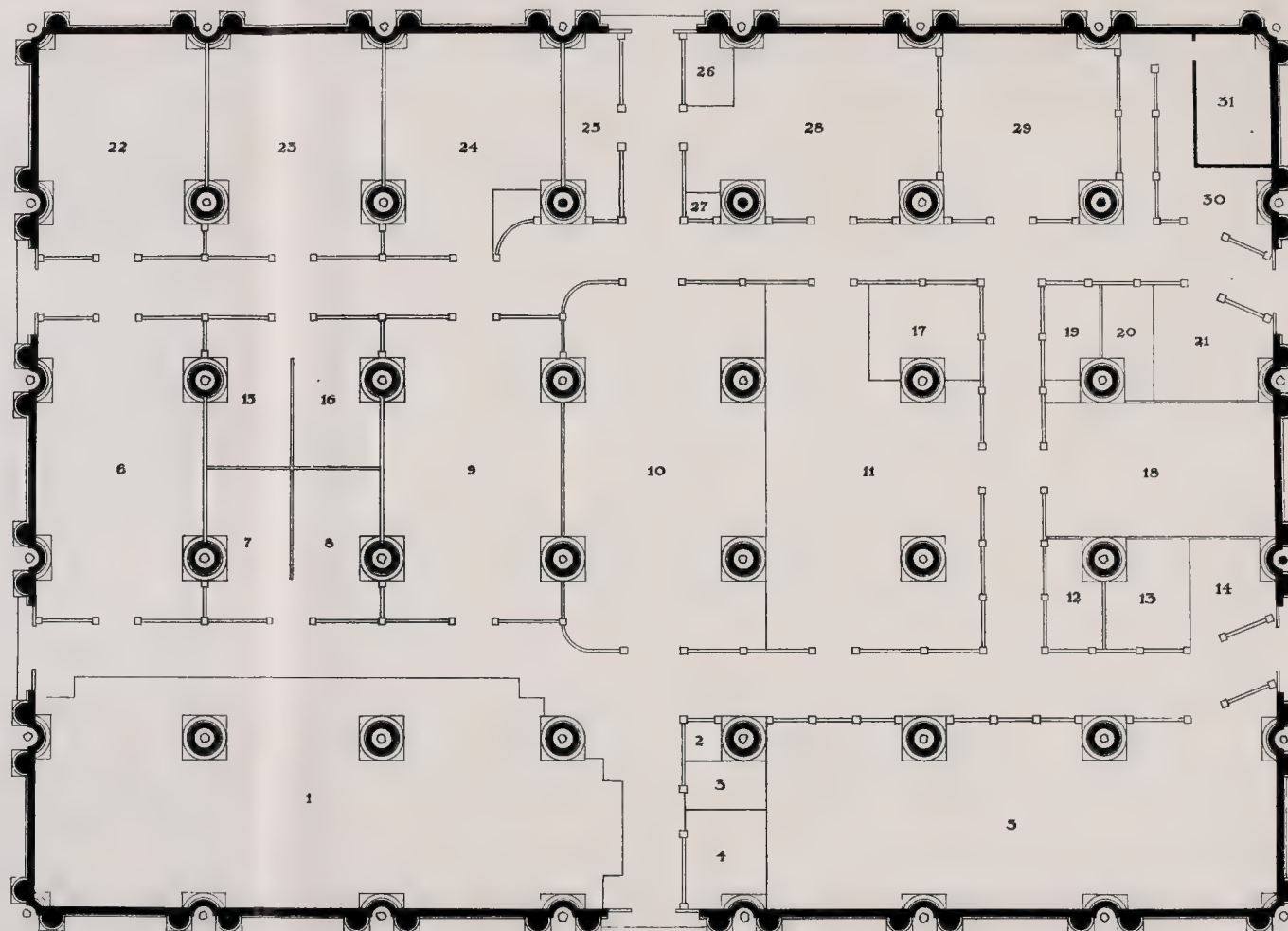
1. Life insurance statistics, charts, etc. The Mutual Life Insurance Company, New York.
2. Rotary duplicating machine. The Neostyle Manufacturing Company, New York.
3. Banking machine. The American Arithmometer Company, St. Louis.

4. Book wire-stitching machines. Fred P. Rosback, Chicago.
5. Operative commercial printing office:
 - American Type Founders Company, New York.
 - Barnhart Bros. & Spindler, Chicago.
 - Hamilton Manufacturing Company, Two Rivers, Wis.
 - Unitype Company, New York.
 - Chandler & Price Company, Cleveland, Ohio.
 - National Machine Company, Hartford, Conn.
 - F. Wesel Manufacturing Company, New York.
 - Harry B. Rouse, Chicago.
 - Hempel & Dingens, Buffalo.
 - Joseph Wetter & Co., Brooklyn.
 - The Inland Printer, Chicago.
6. Life insurance statistics, etc. The Equitable Life Assurance Society, New York.
7. Typewriting machines. The New Century Caligraph and the Densmore Type-writer companies.
8. Typewriting machines. The Smith Premier Typewriter Company, Syracuse, N. Y.
9. Publishers' headquarters. United States department of liberal arts.
10. Newspaper perfecting machine. The Goss Printing Press Company, Chicago.
11. Line-casting machines. The Mergenthaler Linotype Company, New York; composing and imposing room, New York Times.
12. Bookbinding machinery. Latham Machinery Company, Chicago.
13. Addressing machines. The Addressograph Company, Chicago; stencil-cutting machine. Imperial Manufacturing Company, Elkhart, Ind.
14. Typesetting machines. The Unitype Company, New York.
15. Typewriting machines. The Yost Typewriter Company, New York.
16. Typewriting machines. The Remington Standard Typewriter Company (Wyck-off, Seamans & Benedict), New York.
17. Printing press. Harris Automatic Press Company, Niles, Ohio.
18. Printing press. Campbell Printing Press Manufacturing Company, New York.
19. Type-justifying apparatus. The Des Jardins Type Justifier Company, Hartford, Conn.
20. Water filters. William Jandus, Cleveland, Ohio.
21. Acid blast for etching. Louis Edward Levy, Philadelphia.
22. Office. United States Express Company.
23. Phonographs and graphophones. The Columbia Phonograph Company and the American Graphophone Company, New York.
24. Printing press. The C. B. Cottrell & Sons Company, New York.
25. Printing-office furniture. The Hamilton Wood Type Manufacturing Company, Two Rivers, Wis.
26. Book-sewing machines. The Singer Manufacturing Company, New York.
27. Specimens of wood type. The Hamilton Wood Type Manufacturing Company, Two Rivers, Wis.
28. Printing press. The Miehle Printing Press and Manufacturing Company, Chicago.
29. Printing press. The Babcock Printing Press Manufacturing Company, New London, Conn.
30. Type casting and setting machines. The Lanston Monotype Company, Washington, D. C.
31. Electrical service plant. United States department of liberal arts.
32. Reading room. Collective exhibit of journals and publications.
33. United States press headquarters. United States department of liberal arts.

UNITED STATES SPACE IN PALACE OF VARIED INDUSTRIES.

UNITED STATES
PRESS HEADQUARTERS
33

READING ROOM
32



PARIS EXPOSITION OF 1900.
PLAN OF INSTALLATION IN UNITED STATES PUBLISHERS BUILDING
GROUP III ANNEX.
ESPLANADE DES INVALIDES.

10 10 10 10
SCALE OF FEET.

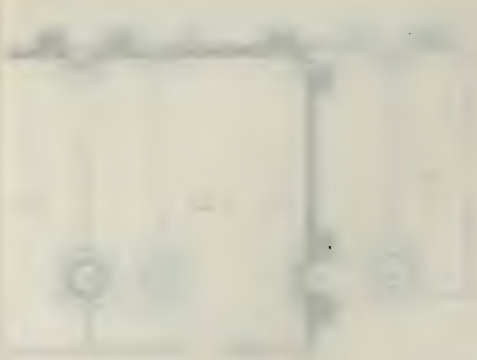


Figure 1. Schematic diagrams of the four structural models.

ORIGIN OF BUILDING—THE EXHIBITS.

[Group III, Class 11.]

TYPOGRAPHY—EQUIPMENT, PROCESSES, AND PRODUCTS.

The United States publishers' building was the consummation of a pre-Exposition plan, conceived by the director of this department before he became a member of the United States Commission, to make a composite, working exhibition of United States typefounding products, printing-house machinery, appliances, devices, and printers' supplies at the Paris Exposition of 1900. As early as August, 1896, the subject was taken up by the writer in Paris with the French Exposition authorities with a view of arranging in a preliminary manner for an exhibition of this character, provided Congress did not make adequate appropriation for a special building to be devoted to this purpose in its general act covering the Exposition. Early in the fall of 1898, the French Exposition authorities having accorded the Commissioner-General an area of space in the garden of the Esplanade des Invalides section outside the regular Exposition palace, and the Commissioner-General having expressed a willingness to give favorable consideration to the idea of providing quarters for the press of the United States and the general publishing fraternity, in combination with an exhibit of printing-house machinery, the head of this department addressed the following communication to the Commissioner-General upon this subject:

PARIS, October 29, 1898.

HON. FERDINAND W. PECK,

*Commissioner-General for the United States to the
Paris Universal Exposition of 1900.*

DEAR SIR: In reference to a United States press building and composite printing plant at the forthcoming Exposition, I have the honor to state that the construction and maintenance of a United States press building at the Paris Exposition will be a source of great convenience to the publishers of our country.

At all, or nearly all, expositions held in the United States adequate provision has been made for the press, and especially was this the case at the Chicago World's Fair.

So much so has this been a feature of recent expositions that the possibilities for departure into fields of novel and unique demonstration will be practically limited to improvements which have been made in architectural materials and designs and the perfection of automatic mechanical appliances in the production of printed matter, if the whole affair is to be handled as a composite exhibit.

From a typographical and mechanical point of view, it appears to me as very desirable that opportunity be given United States exhibitors to present to the world on this occasion the very latest machinery, appliances, and processes used in the production of a modern American newspaper, as well also as the several distinct classes of printed matter as understood in the United States. This latter can also, perhaps, be fully provided for in the space allotted the United States in Group III, classes 11, 13, and 14.

From my limited experience in exposition affairs, I am very much inclined to the opinion that it will be most desirable to publish in the Exposition grounds daily, or

at such stated periods as the exigencies may demand, a small newspaper, pamphlet, or brochure, which will, in a sense, be the key to the whole situation from an English-speaking point of view.

It is safe to predict that fully 75 per cent of United States visitors and 60 per cent of visitors from England proper will not be able to understand the French language sufficiently to gain a perfect knowledge of the Exposition in detail. I therefore deem this feature of sufficient importance to warrant a publication of the above character, very likely in English, French, and German.

It should be a comprehensive reflex of all United States exhibits and their location and general points of interest, with a complete directory of United States exhibitors, names of the persons in charge of the same, the hours at which they may be found at the exhibit, together with their city addresses, etc.

This publication could be produced each day, or at such intervals as may be desirable, in complete form in full view of the public, or the pages of its general contents could be prepared in advance at some place remote from the press building or the general printing machinery exhibit, and only those pages which contain the announcements of official events, lists of important arrivals, and items of news, etc., printed in the presence of the public and inserted at their proper place in the publication immediately previous to its distribution.

Personally, and with a zealous interest for my own art, I should like to see exhibited at this Exposition not only a composite exhibit of all the many novel machines and processes which have been invented and perfected in the United States for use in the printing art, but also the exposition of what is known in the United States as a typical rotary newspaper printing machine—such a machine as will produce, approximately, 100,000 perfected newspapers per hour—which will take the paper from the web and print it, cut it, paste it, fold it, count it, and deliver it in packages.

To make an exhibit of such a great machine would entail the expenditure of a large sum of money upon the part of the exhibitor, and, as previously pointed out to you, it is not likely that any one of the manufacturers of such machines would undertake such an exhibition without a reasonable chance of remuneration or disposition of the machine at the close of the Exposition.

The newspaper printing plant could consist of machines for the mechanical composition of type, a demonstration of the rapid and practical methods of composing forms of type, the quickest known process of making matrices from papier-maché or other materials, the casting of stereotype plates, trimming and shaping such plates to fit the requirements of the printing press, the printing, folding, counting, and delivery of printed work.

The proposition to exhibit a general mechanical printing plant, either in connection with the press building or elsewhere, can be exemplified to the extent of exposing to public view the most novel, unique, and perfect machinery, appliances, and processes (automatic to an almost unlimited extent) not previously known or seen by the printing world in composite form. I say this without fear of its being successfully contradicted.

And, further, I believe it will also develop that the great class journals, so called, those journals which in their respective arts and industries give to the commercial world the barometrical indication of supply and demand, will enter into the spirit of assisting and consummating in every possible detail your generous proposition to supply the American press with a headquarters, a home—in other words, a clearing-house—at the Paris Exposition of 1900.

I have the honor to be, sir,

Respectfully, yours,

A. S. CAPEHART.

Following the suggestion to construct a building for this purpose and its adoption by the Commissioner-General, the French Exposition management accorded permission to issue a United States daily news-



C-14. VIEW SHOWING SOUTHWEST CORNER OF PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES.



C-16. LOOKING WEST, NORTH AISLE, PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES.

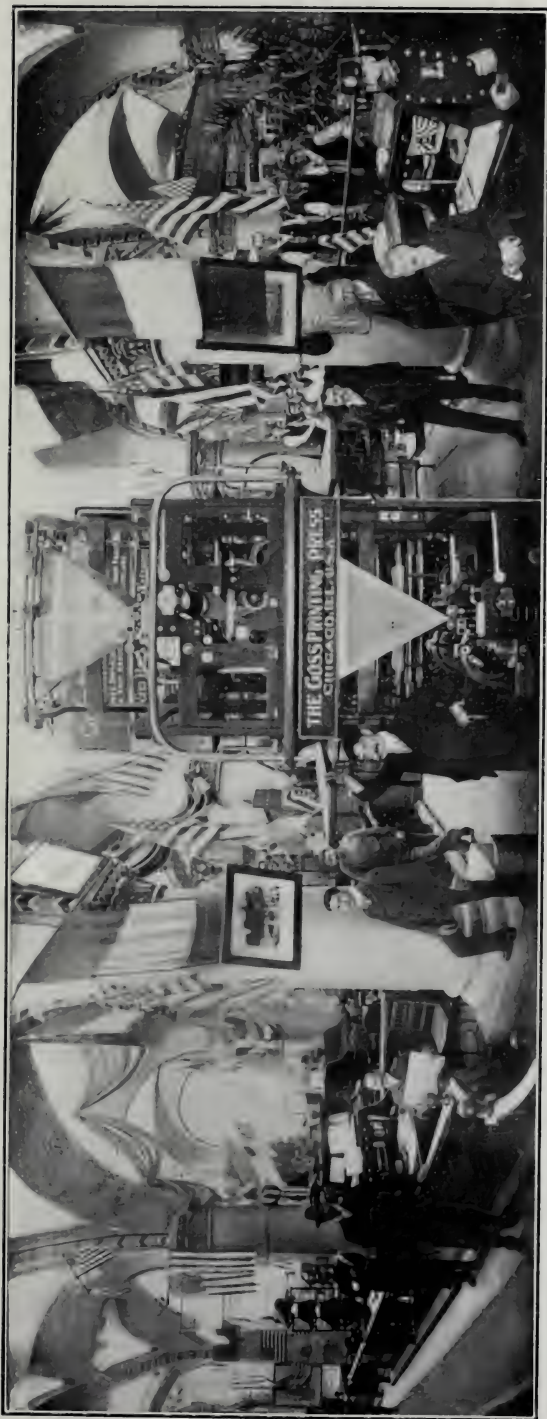
paper within the Exposition grounds. The space set aside for the publishers' building was studded with shade trees, and although allotted to the United States for any purposes within the rules and regulations and classification of the Exposition, was not appropriate for an exposition building, as not a single tree was permitted to be removed in constructing the housing necessary to properly protect the exhibits that were intended to be located upon the area. Similar space had been allotted to practically all the important countries in the same section. Owing to the physical conditions surrounding these areas, a number of the foreign nations, after considering various plans, constructed small buildings, which eventually they allowed to be devoted to concessionary purposes. The spaces between the trees permitted buildings about 12 feet square, which buildings could be connected with small passageways and yet not endanger the trees. It was the original idea of the architects to treat the allotted space in this manner. This plan was objected to, however, by the head of this department, first, because it would not harmonize with the intention of the department to have all its exhibit areas of the open installation character, and, second, for the reason that constructing a series of buildings of this character meant the loss of a very considerable portion of the ground space. It was finally decided to cover the ground with a building having circulating thoroughfares on all four sides, build columns around the bodies of all the trees, and place glass-covered domes over the squares formed by these columns. This gave a building with an open interior, gallery-like in appearance, with the columns around the trees acting as supports to the glass domes, which, all being connected, formed the roof of the building, with the tops of the trees protruding therefrom. The building as thus constructed contained 9,357 square feet of floor area; 1,455 square feet was given up to circulation, leaving a net exhibit area of 7,902 square feet. The interior circulation consisted of two aisles running the full length of the building, each of these aisles having an entrance at both ends; two aisles, one leading from each of the main aisles to the side doors, and one aisle, about the center of the building, which connected the two long aisles. This plan divided the exhibit areas into one central and two side longitudinal sections.

The full area of this allotment to the United States having thus been covered with an exhibition building, and consequently greatly increasing the expense of the structure, and far exceeding the amount it had been decided could possibly be devoted to this building from the Commissioner-General's appropriation, it was determined (in order to meet this extra expense and secure the funds to complete the building and carry out the proposed attractive features) to retain for the actual requirements of official installations in class 11 an amount of space equivalent to that which would have existed had the original idea of the architects prevailed, and to offer the rest of the area to persons

who were willing to make attractive, legitimate unofficial installations (not concessions) harmoniously occupy the additional space thus created, and at the same time provide the extra means required for carrying out the financial portion of this feature of the department of liberal arts and chemical industries. Thus it was that in allotting the space in this building such institutions as the Mutual Life Insurance Company of New York, the Equitable Life Assurance Society, the Columbia Phonograph Company, the Smith Premier, Wyckoff, Seamans & Benedict (Remington Standard), the Yost, New Century Caligraph, and Densmore typewriter interests, and the United States Express Company, in combination with some minor official exhibitors whose areas were extended for convenience in operating machinery, contributed the necessary funds, and together occupied 3,387 square feet of the floor space, while official exhibitors in class 11 occupied 5,790 square feet. There were 11 contributing occupants and 32 official installations in this building.

The plan to have the building combine a general headquarters for United States publishers and their representatives with an operative newspaper publishing and commercial printing plant, issuing a typical United States daily newspaper, together with the work of securing the funds necessary to properly house the additional space created, naturally entailed a very considerable amount of solicitation, frequent visits to different parts of the United States, and much correspondence. The necessary contributions being secured, the physical material was all finally arranged for and completed in detail by the Goss Printing Press Company, of Chicago, contracting to construct and install ready for operation one of its well-known and efficient four-deck, compound, multiple, straight-line newspaper perfecting machines and a complete modern stereotyping equipment. The Monoline Composing Company of Washington, D. C., was the only company to make application for the exhibition of line-casting machines. The application of the Monoline Company was accepted with the understanding that the monolines would be placed at the disposal of the publisher who undertook to get out the daily paper during the Exposition. Exhibitors of other styles of type-composing machines were solicited to have their machines work regularly for the daily newspaper, but none of them consented. When the Goss Company guaranteed to exhibit in operative form one of its best presses and stereotyping outfits, the monoline machines made the plant complete for modern mechanical daily newspaper production.

The management of the New York Daily Times arranged with the Goss Company to print an issue of the Times each day during the Exposition. About two weeks before the official opening of the Exposition, however, the Mergenthaler Linotype Company, which company had not previously made application for exhibit space, entered



C-18. GOSS NEWSPAPER PRESS AND CENTER VIEW OF PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES.

a protest against monoline composing machines being exhibited in a United States section. Investigation showed that the monoline machine was the invention of a United States citizen and a development of United States energy and capital; that it produced the same results as the linotype machine, but that the monoline machines intended to be exhibited in the United States section were manufactured in the monoline factory at Montreal, Canada. While it is the custom at expositions not to give recognition to a protest against an exhibitor unless the protesting party is also an exhibitor, this particular case was referred to the French Exposition authorities, with the result that under the rule of the Exposition to the effect that the country of origin of exhibit and not the country of origin of application determined the exhibition section, the monoline machines were ruled out of the United States section and exhibited in the Canadian division of the British section. The Mergenthaler Linotype Company, New York, then installed a plant of five line-casting machines in the space immediately adjoining that of the Goss Company, a portion of the Mergenthaler linotype space being eventually devoted to a general composing and imposing room equipped by the American Type Founders Company, the Hamilton Manufacturing Company, and others.

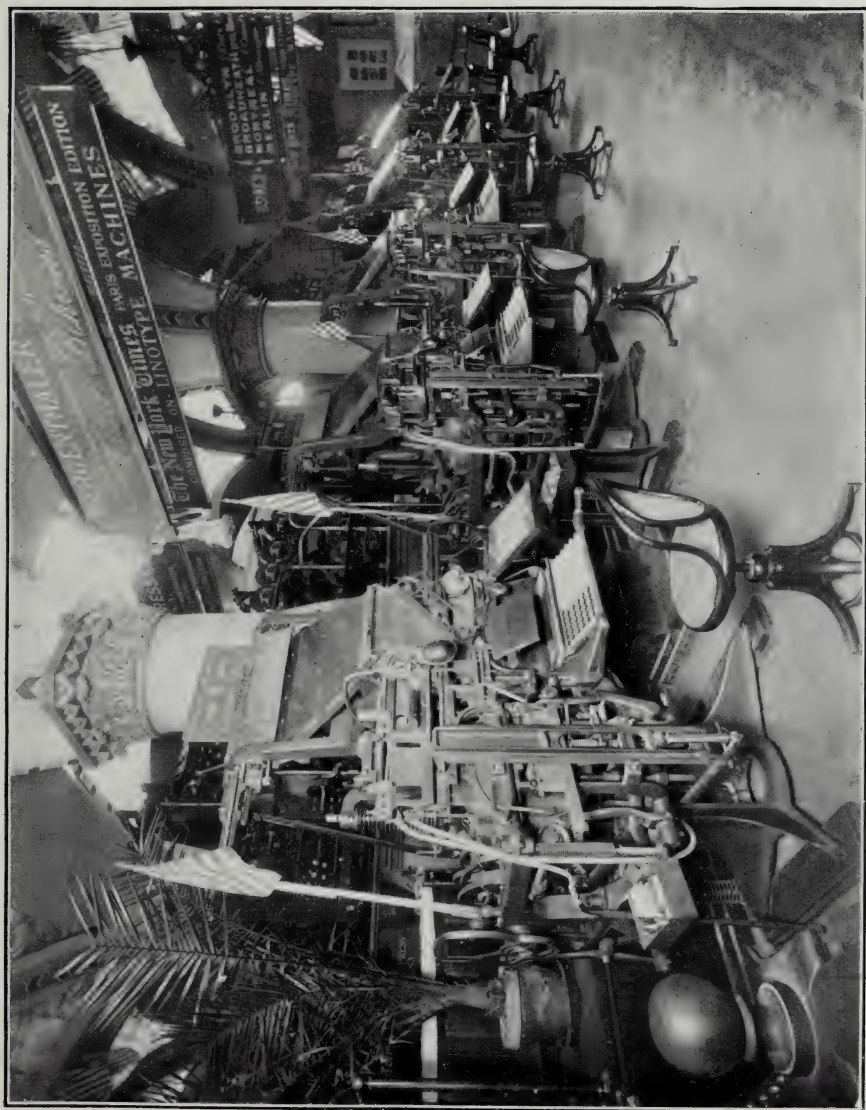
The hours of composition on the linotype machines were confined to those which usually prevail on afternoon newspapers in the United States. The operators were members of the International Typographical Union and had been engaged in New York and other cities by the management of the Times for service during the period of the Exposition. The features of the newspaper exhibit which attracted the most attention on the part of foreign publishers were the large number of pages produced with but five linotype machines, maintaining the exact hour of issue each day, and the compound methods of the Goss press—that is, running any one or any selected number of decks of cylinders without operating all of them, at the will of the publisher. The printing of a 12, 14, or 16 page paper with but five linotype machines was accomplished by the publisher being able to stereotype one or any number of pages, in complete page form, for any day's issue, from the duplicate matrices expressed to Paris from the New York office of the Times, and to use the linotypes for setting only his local and cable news.

The linotype machines maintained their reputation for reliability and efficiency throughout the period of the Exposition. Each machine was a unit in itself: That is each machine was operated by an electric motor attached to the frame of the machine. It was noticed, however, that the French agent for the linotype company was anxious that the nationality of these particular linotypes should not be generally known. The English Linotype Company supplies the French market, and the United States made linotypes exhibited in the publishers' building,

like all other United States made machinery when compared with European made machinery of the same class, showed marked superiority in both design and construction.

To keep a bank of line-casting machines in continuous operation and maintain a high standard of efficiency during the entire period of a great Exposition, where buildings must be kept open, where the movement of thousands of persons naturally creates currents of air and dust, which interfere with preserving an even temperature of metal and affect bearings and the movement of mechanical parts necessarily accurate, requires solution in advance of problems that come only to those familiar with the intricate details of typefoundry, the technique of machines for the mechanical composition of type, the art of printing, and the science of expositions. That these linotype machines were kept in a high state of efficiency throughout the period of the Exposition, never once failing to perform their functions in the production of the Exposition daily newspaper, was due, at least in a large measure, to the willingness of the exhibitor to follow the suggestions of the head of this department, who had installed and conducted three operative newspaper exhibitions at as many previous European expositions, the careful daily attention given the machines by the mechanical experts in charge, and the vigilance and intelligence of the compositors who operated them; for reference to the plans of the publishers' building will show that these machines were installed at right angles to and between the two main circulating aisles of the building and the cross aisle that connected these two passageways, all of which were so congested most of the time as to require special guards to keep the people moving. Yet within this small space and under these trying conditions the pages of the Paris Exposition edition of the New York Times were composed and imposed with the same regularity and precision that prevails in the home establishment of this metropolitan daily newspaper.

Under the terms of the official authority by which the daily newspaper at the Exposition was issued, it was not permissible to install the editorial, news, or counting rooms within the Exposition grounds. Consequently these necessary features were conducted on the outside. Owing to excessive import duties, ink and paper were purchased in France. The paper went to press at 4 o'clock each day, and there was no charge for papers distributed at the press. When matrices were made for the regular issue of the Times in its New York office duplicates of these matrices were drawn and shipped to Paris by express in strong paper cylinders. The large number of fast steamers plying between New York and European ports during the summer months made it possible to receive these duplicate matrices almost daily at the publishers' building, and always several hours in advance of the mail delivery of New York daily newspapers of the same date in Paris.



C-13. INSTALLATION OF MORGENTHAU LINOTYPE MACHINES, PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES.

Selections from these matrices of such matter as proved desirable, with the addition of 2, 4, or 6 pages of cables, European and Exposition news composed on the scene, enabled the Times to issue each day a first-class newspaper ranging from 8 to 16 pages in size. The publication of the Times began on the 30th day of May and ended on the 31st day of October. The manufacture of a daily newspaper in all its details (the stereotyping room being located about 100 feet from the composing room and press in a special building) under the eyes of the public proved to be most interesting and was perhaps the most attractive of any of the United States displays, if not of the entire Exposition, and brought much credit justly due to the enterprise and courage of the management of the New York Times in carrying out the expensive details.

In addition to the operative newspaper plant, the American Type Founders Company, New York, and Messrs. Barnhart Bros. & Spindler (Great Western Type Founders), Chicago, in combination with the Hamilton Wood Type Manufacturing Company, Two Rivers, Wis.; Hempel & Dings, Buffalo; the Inland Printer Company, Chicago; the National Machine Company, Hartford, Conn.; Harry B. Rouse, Chicago; the Unitype Company, New York; F. Wesel Manufacturing Company, New York; Joseph Wetter & Co., Brooklyn, and the Chandler & Prize Company, Cleveland, installed a fully equipped and working American commercial printing establishment. The installation included the very best productions in United States typefounding, general printing office supplies, machinery for the mechanical composition of single movable types, paper and card cutters, material for binding stationery, etc., and platen presses, all displayed in correct sequence and as utilized in the United States in practical operation.

The exhibition of flat-bed book, mezzotint, and color printing presses was made by C. B. Cottrell & Sons Company, New York; the Miehle Printing Press and Manufacturing Company, Chicago; the Babcock Printing Press Manufacturing Company, New London, Conn., and the Campbell Printing Press Manufacturing Company, New York, each manufacturer installing and operating one press throughout the Exposition. The Miehle press was the only one which did color work, and this press, as well as that of the Campbell Company, was kept in operation doing commercial work practically during the whole period of the Exposition.

Additional exhibitions of machinery were made in this building by the Addressograph Company, Chicago, a machine for addressing envelopes and wrappers, and a machine for making printing plates for addressing purposes; the Des Jardins Type Justifier Company, Hartford, Conn., machines for automatically justifying lines of composed type and distributing type; W. N. Durant, Milwaukee, counting mechanisms for use on printing presses, line-casting, and other machines; a

special exhibition by the Hamilton Wood Type Manufacturing Company, Two Rivers, Wis., of wood type, ornaments, and general printing house furniture and supplies; the Harris Automatic Press Company, Niles, Ohio, two types of the Harris rapid automatic job printing press; the Imperial Manufacturing Company, Elkhart, Ind., machines for cutting stencils in cardboard; the Lanston Monotype Company, Washington, D. C., machine for automatically casting type and composing the same into lines, together with machine for predetermining the justification of lines of composed type; the Neostyle Manufacturing Company, New York, rotary duplicating machines.

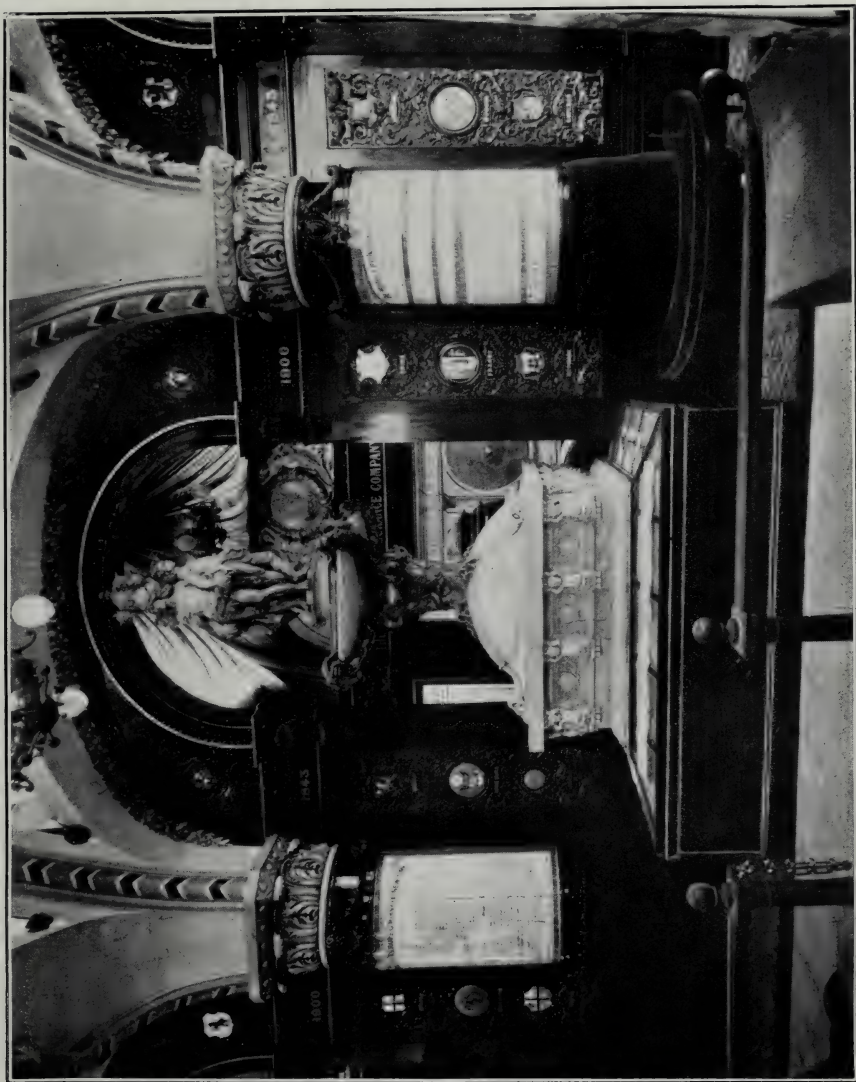
The exhibition of bookbinding machinery, in addition to that shown in the commercial printing office, consisted of installations made by the Singer Manufacturing Company, New York, machines for binding books and pamphlets; the Latham Machinery Company, Chicago, wire-stitching, paging, and numbering machines; and that of Fred P. Rosback, Chicago, special wire-stitching machines for book and pamphlet work.

EXHIBITS OF LIFE INSURANCE COMPANIES.

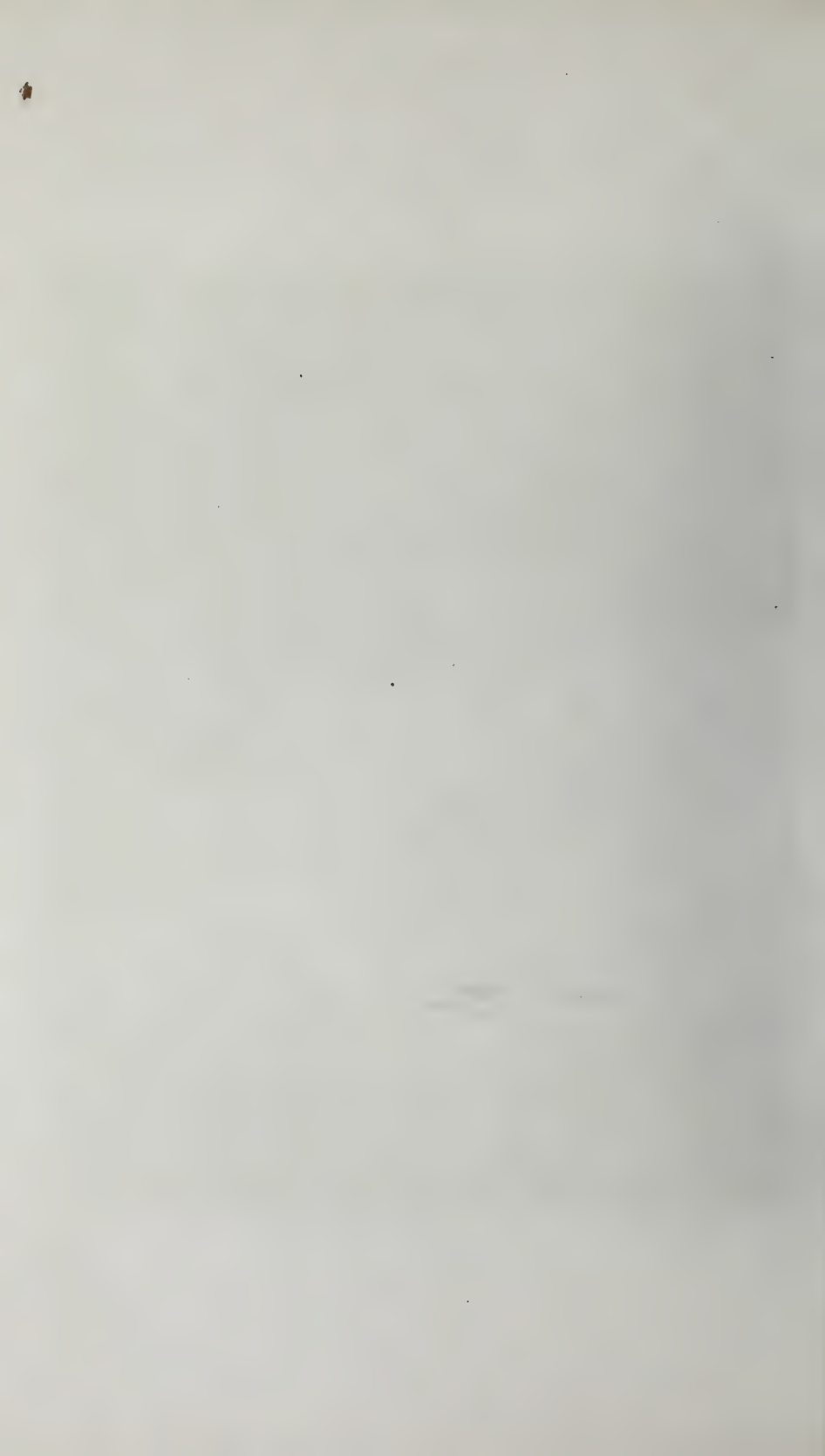
In accordance with the French classification, life insurance exhibits were officially located in the palace of social economy. The allotment of space to the United States in this building was so limited in area that the two large United States insurance companies which proposed to exhibit found it impracticable to attempt to utilize the small space it was possible to allot to each of them in this section. Consequently, under the arrangement agreed upon for the construction of the publishers' building (which was that two-thirds of its area was to be devoted to the exhibition of printing-house machinery, materials, and supplies, and one-third to exhibitors whose products were officially located in spaces elsewhere which were inadequate, and who would be willing to contribute largely to the construction of the building), the Mutual Life Insurance Company of New York and the Equitable Life Assurance Society, New York, both became contributors to the publishers' building fund.

The Mutual Life Insurance Company of New York selected the northeast corner of the building and the Equitable Life Assurance Society secured the east end of the center section, located between the two main entrances.

The Equitable made two exhibits, the principal one being located in the publishers' building and the smaller one in the United States social economy section, palace of social economy, while the Mutual made but one exhibit, that being located in the publishers' building. The former's exhibit, owing to space limitations, was restricted to three wall frames, on which was represented, by means of comparative diagrams, the outstanding insurance, the surplus, and the assets of the Equitable Society at the beginning of each decennial period of its history.



C-20. SOUTH FAÇADE, MUTUAL LIFE INSURANCE COMPANY'S INSTALLATION, PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES.





C-21. INTERIOR VIEW, MUTUAL LIFE INSURANCE COMPANY'S INSTALLATION, PUBLISHERS' BUILDING ESPLANADE DES INVALIDES, LOOKING WEST.

THE MUTUAL LIFE INSURANCE COMPANY OF NEW YORK.

The exhibit of this company was really a magnificent one and, from the rich and artistic manner in which the space was treated, it stood out in sharp contrast with the surrounding installations. The physical conditions were such that this space had an east and a north wall and an entrance at both its east and north ends. The façades which the Mutual Company constructed on both sides of its exhibit area were not only highly ornamental and in harmony with the general architectural and decorative features of the interior of the building, but they were also rich and attractive in appearance as well as useful for exhibition purposes. The interior of the space was arranged to provide the greatest possible wall area for the exhibition of the company's charts and diagrams, with the walls of the room divided into large panels. In addition to this, the space along the north or exterior wall of the building had a series of flat cases for similar charts, and below these portfolio cases were arranged to accommodate charts, etc., for reference or occasional exhibition. Seats were so arranged as to enable the public to conveniently study the exhibit. The center of the room was occupied by a combination desk and bookstand, large books, handsomely bound and containing the printed forms in daily use by the company, being placed thereon for public inspection. At a short distance from either end of this stand were two triangular stands for diagrams.

The most attractive feature of the exhibit, situated in the central arch on the main façade, was a fountain symbolical of the operations of the company. The construction of this fountain was based upon one of the company's statistical charts, in correct mathematical proportions, representing its financial history from the time of its incorporation to the year 1900. The diagram from which this was taken was formed into a four-sided vase or basin supported by intertwining live-oak trees growing from the earth, typifying strength, age, and mutual support. Among the branches were small shields, containing insignia of the arts, sciences, and trades, denoting the people from whom the company derives its support. Above the vase, on a round pedestal, were four representative figures to typify the world-wide sources from which the company receives business. These figures bore vessels from which poured forth the water, an emblem of money put into the company. This water, falling into the vase, left there the reserve fund, and, overflowing, fell down upon the earth, where it was distributed to the beneficiaries, who were typified at the base.

The sides of the façades facing on the aisles were richly decorated, and worked into this decoration were plaques or shields bearing the arms of all nations. The vaulting within the room was colored to accord with the general color scheme of the building and the floor was appropriately carpeted.

The exhibit itself consisted of statistical, historical, pictorial, and

geographic charts prepared from statistics of mortality experience, financial growth, and business development of the oldest life insurance company in the United States, and, as the assets of the Mutual exceed those of any other company it therefore claims to be the largest life insurance company in the world. Some of the charts also showed the company's progress compared with the development of the country, agriculturally and financially, since the company was founded. The growth of the country in population, its increase in lines of railroads, and its great financial strength were illustrated by charts, thus demonstrating the strength of financial institutions in the United States. One series of charts outlined for the first time the evolution of the science of life insurance, each distinct phase or epoch of its evolution being the subject of a separate chart.

THE EQUITABLE LIFE ASSURANCE SOCIETY.

The most striking features of the Equitable's exhibit in the publishers' building were reproductions of the Paris Arc de Triomphe, the Eiffel Tower, and the New York Statue of Liberty. These showed during the day a series of figures, the Statue of Liberty thus heralding the amount of the enormous assets of the society, the Arc de Triomphe the surplus, and the Eiffel Tower the outstanding assurance. The figures, being taken from each decennial period, illustrated in a very striking way the phenomenal growth of the society. These figures appeared in black against the white outlines of the beautiful reproductions, and were, by an ingenious device, flashed out in different colors, electricity being used for the purpose. The entire exhibit was surmounted by the word "Equitable" in large letters, also illuminated, and could be seen from any part of the building.

This plan proved most effective in showing the stupendous growth of the Equitable Life Assurance Society, and the installation being of the free, open character it permitted visitors to consult the numerous charts, specimens of policies, etc., that were on the tables for the use of those interested. Another impressive feature was a series of very large photographs of the many Equitable buildings throughout the world.

A picture of the late Henry B. Hyde, the founder of the society, hung on one side of the exhibit, and that of the president, Mr. James W. Alexander, on the opposite. Numbers of statues, representing the Equitable's emblematical group, enhanced the artistic appearance of the whole exhibit, making it one of the most striking and attractive in the building.

The Paris manager of the Equitable being a member of the international jury of awards, the exhibit of this company was, in accordance with the rules of the Exposition, placed "hors concours" as to award.



C-22. NEW YORK EQUITABLE LIFE ASSURANCE SOCIETY'S INSTALLATION (EXHIBIT FACING WEST), PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES.



C-23. NEW YORK EQUITABLE LIFE ASSURANCE SOCIETY'S INSTALLATION, PUBLISHERS' BUILDING, ESPLANADE DES INVALIDES, VIEWING EXHIBIT FROM NORTHWEST.

THE JURY'S APPRECIATION OF THE EXHIBITS.

In connection with the part the publishers' building played in the participation of the United States at this Exposition, it may not be out of place to here refer to the fact that the international jury, separate from all other awards, bestowed a grand prize on this building and its contents, as "thus emphasizing the jury's appreciation of the success achieved by the director and his staff who installed this building and the exhibitors who contributed collectively the machinery for this complete and magnificent printing plant." Referring to the printing machinery direct, the United States jurors stated officially that the international jury in class 11, "after careful and repeated examinations of the five printing presses exhibited by the Goss Company, Cottrell & Sons Company, the Miehle Company, the Babcock Company, and the Campbell Company, respectively, although admitting that each press possessed advantages and perfections entitling it to an award of grand prize, the whole international jury decided that it was impossible to award five grand prizes to as many exhibitors of one nation in a single division of one class." Notwithstanding this decision individual members of the jury, in voting, marked coefficients so high on the Goss, Cottrell, Miehle, and Babcock presses that each, in accordance with the schedule, would have been entitled to the grand prize had not the previous decision prevented. The jury then awarded "five gold medals individually to each of the five printing presses exhibited and a grand prize to them collectively," while the jury in class 13 gave a grand prize to the collective exhibit of United States journals and periodicals, in which about 400 publishers participated.

PHYSICAL FEATURES OF THE BUILDING.

For the purpose of creating wall space the south-side entrance to the publishers' building was closed. It was presumed that the east front of this building would be the main one, as it faced the west wall of the main exhibit palace at a point where the United States exhibits in the varied industries classes were located. The fact that a stairway exit leading from the moving sidewalk station brought passengers to the ground at the west end of the building made this latter end of the building fully as attractive than the one facing east. Between the publishers' building proper and its two annexes there was eventually constructed a canopy, covering the street for the distance it run between these buildings. The exterior of the publishers' building, on all four sides, carried signs, in panels, of exhibitors. Along the base of these panels were planted blooming flowers and climbing vines, which, together with the foliage of the trees that protruded from the roof, gave a pleasing landscape effect to the entire structure.

WHERE THE EXHIBITS WERE LOCATED.

On entering the building at the west, north entrance, the first exhibit on the left was that of the commercial printing office. This was followed on the same side of the aisle by the magnificent and elaborate exhibit of the Mutual Life Insurance Company of New York. These two exhibits, with those of the American Arithmometer Company, Fred P. Rosback and the installation of a Neostyle machine, occupied the entire north section of the building. Passing into the building by the same entrance, the first space (central section) was devoted to the exhibition of a flat-bed printing press as the central figure, surrounded by type setting and justifying machinery, addressing and stencil machines, counting, numbering, and stitching machines, and the acid blast etching invention of Louis Edward Levy, Philadelphia. The second space in the central section was occupied by the Mergenthaler linotype machines, the general-composing and imposing room of the New York Times, and an exhibit of Harris automatic printing presses. The next adjoining space contained the Goss printing press, which stood at right angles to the length of the building. Then came the general office and headquarters for publishers; then the exhibition of typewriting machines; and then the attractive exhibit of the Equitable Life Assurance Society of New York.

On the south side of the building, beginning at the west entrance on the right, the first section was occupied by the electric power and lighting plant, fire extinguishing apparatus and hose, water service, and the exhibition of the Lanston Monotype Company, followed in the next spaces successively by that of the Babcock printing press, Miehle printing press, Singer Sewing Machine Company, Hamilton Manufacturing Company, the Cottrell press, the Columbia Phonograph Company, and the office of the United States Express Company.

The smaller of the two annexes was devoted exclusively to a general press headquarters, while the larger one was given up wholly to the exhibition of journals and periodicals and a general reading room. In the publishers' headquarters, located in the center of the publishers' building, an office was maintained for the convenience of United States publishers, their representatives and friends, and from this office Exposition passes and other courtesies were supplied newspaper publishers, correspondents, and others identified with the publishing fraternity.

CONCLUSION.

As previously stated elsewhere in this report, exhibitors in this department paid for all façades, much of the decorative material and labor connected therewith, furniture, expenses of the chemical expert, and for the publishers' building project. The funds contributed by exhibitors were deposited with the American Trust and Savings Bank,



C-17. NORTH AISLE OF PUBLISHERS' BUILDING, LOOKING EAST, ESPLANADE DES INVALIDES.

Chicago, Ill., and through that institution disbursed. Contracts for all constructions for this department were made, either by the decorative department or the architects of the commission, and when approved by the Commissioner-General copies of these contracts were deposited with the secretary and disbursing agent, who, acting as temporary agent for this department, received the money necessary for and paid the contractors' bills when due. This procedure relieved this department of practically all responsibility involved in this feature of the work. In every instance the cost of completed constructions exceeded the estimate of that department under which the contract was made. By consolidating the order for exhibit cases required for Government exhibits with that for cases ordered by exhibitors, the best of cases were obtained at a nominal price. At the close of the Exposition decorative and constructive material was required to be removed and the spaces cleared. Duty was demanded upon everything sold. In many instances it proved wise to abandon rather than attempt to realize upon articles of this character. Where sales were made of Government property the purchaser paid the disbursing agent direct. In cases where the property belonged to exhibitors purchasers settled with the exhibitors or the money was credited back to the fund from which originally taken. In the case of the publishers' building and its surrounding annexes the constructor's price provided for removal after the close of the Exposition. After all claims have been settled and all bills paid there will be a surplus in several of the divisions of the fund of this department.

In closing the report of the department of liberal arts and chemical industries, I would fail in the full discharge of my duty did I not endeavor to give expression to the feeling of gratitude possessed by each and every member of my department for the universal courteous and generous treatment received at the hands of the Commissioner-General, his director in chief of exhibit departments, the secretary and disbursing agent, and those exhibiting, both officially and unofficially, in spaces under my charge who responded so liberally and promptly to all requests and demands; as well as to extend my thanks to all the members of my department for their faithful and conscientious attention to the duties assigned them.

I have the honor to be, respectfully, yours,

ALEXANDER S. CAPEHART,
*Director of the Department of Liberal Arts
and Chemical Industries.*

HON. FERDINAND W. PECK,
*Commissioner-General for the United States
to the Paris Exposition of 1900.*

REPORT OF THE DIRECTOR OF THE DEPARTMENT OF
MACHINERY AND ELECTRICITY.

FRANCIS E. DRAKE, DIRECTOR.

DEPARTMENT OF MACHINERY AND ELECTRICITY.

CONTENTS.

Space, staff of department—Classification—Cataloguing—Key to illustrations—Plan of installation Champ de Mars—Key to plan of installation Champ de Mars—Proposition to furnish power for the Exposition—Assistant director—Retrospective exhibit—Space, demands, and supply—United States machinery annex, Bois de Vincennes: Space for United States machinery building; visit to Paris to secure space; idea approved by machinery experts; space for building granted; cost to be shared by exhibitors; plan of installation; key to plan of installation; cost of construction of building; difficulties met; outside covering for building; process of building; power plant for machinery building—Enlargement of Vincennes exhibit—Machinery building enlarged—Large triangular tract allotted the United States—Plan of installation, United States triangle at Vincennes (key to plan of installation)—Power plant complete—Electrical exhibit—Erection of machinery building—Installing power plant—Some leading exhibitors withdraw at last moment—Confusion in the Champ de Mars space—Façade of Salon d'Honneur (plan of installation, Salon d'Honneur; key to plan of installation)—Delay and expense caused by loss of steamer *Pauillac*—Champ de Mars section complete at opening of Exposition—Retrospective exhibit partially installed—Opening of machinery building—Champ de Mars exhibits exposed—Lighting United States pavilion and exhibit sections—Members of staff resign to act as jurors—Awards—Special jury appointments—Machinery building and power plant sold—Operation of machinery building—Special service rendered by power plant—Dismantling of building—Discharge of all obligations of the department—Packing and return of exhibits—Description of exhibits by classes—Specimens constituting retrospective exhibit.

STAFF OF THE DEPARTMENT.

F. E. Drake, director of machinery and electricity.

September 10, 1898, appointed director, at a salary of \$3,300 per annum.

June 15, 1899, salary increased to \$3,600 per annum.

March 1, 1900, salary increased to \$4,800 per annum.

May 31, 1900, resigned as director to take position as juror in class 22, at \$4,800 per annum.

August 15, 1900, reappointed director, at \$4,200 per annum.

James S. Anthony, assistant director of machinery and electricity.

January 20, 1899, appointed assistant director, at a salary of \$2,000 per annum.

March 1, 1900, salary increased to \$2,600 per annum.

May 31, 1900, resigned as assistant director to become a juror in class 26, at \$2,600 per annum.

August 15, 1900, reappointed assistant director, at \$2,300 per annum.

Walter R. Talbot, chief clerk, machinery and electricity.

December 8, 1898, appointed chief clerk and stenographer, at \$1,500 per annum.

March 1, 1900, salary increased to \$1,800 per annum.

June 1, 1900, designated acting director until August 15.

July 1, 1900, salary reduced to \$1,650 per annum.

Charles T. Malcolmson, expert.

July 20, 1899, appointed electrical and mechanical draftsman, at \$1,200 per annum.

March 15, 1900, salary increased to \$1,500 per annum.

May 31, 1900, resigned as expert to become juror in class 23, at \$1,500 per annum.

August 15, 1900, reappointed expert, at \$1,350 per annum.

James B. Hayden, expert.

December 27, 1898, appointed draftsman at \$1,200 per annum.

August 15, 1899, resigned.

Horace S. Powers, expert.

November 26, 1898, appointed draftsman at \$425 per annum until December 15; after that date to receive \$720.

January 15, 1899, left the service of the Commission.

February 9, 1899, reappointed draftsman at a salary of \$900 per annum.

April 30, 1900, resigned.

Roy B. Tabor, messenger and clerk.

December 6, 1898, appointed messenger to Groups IV and V, machinery and electricity, and Group XI, mining and metallurgy, at a salary of \$480 per annum, the two departments paying each half of the salary.

June 1, 1899, appointed clerk, under same conditions, at \$750 per annum.

December 31, 1899, his services being entirely confined to the department of mining and metallurgy, that department paid his entire salary after this date.

William D. Ball, expert.

December 9, 1899, appointed engineer of construction at salary of \$1,800 per annum.

March 15, 1900, salary increased to \$2,400 per annum.

May 31, 1900, resigned to be appointed juror in class 25, and after jury service returned to the United States.

Clyde I. Drake, bookkeeper.

June 8, 1899, appointed bookkeeper at \$1,400 per annum.

September, 1899, salary thereafter paid out of the collective fund.

Ernest C. White, expert.

February 5, 1900, appointed expert of installation at \$720 per annum.

July 16, 1900, appointed superintendent of United States machinery building at Vincennes, at \$1,680 per annum.

November 15, 1900, resigned.

Warren E. Weinsheimer, expert.

January 16, 1899, appointed draftsman at \$600 per annum.

October 31, 1899, resigned to take charge of the collective exhibit, out of the funds of which he was paid thereafter.

F. W. Geissenhaimer, expert.

January 9, 1900, appointed expert of installation at \$720 per annum.

May 31, 1900, resigned.

Morris W. Lee, expert.

May 15, 1900, appointed assistant engineer at \$900 per annum.

Charles Dannequin.

May 23, 1900, appointed night watchman and janitor in the Salon d'Honneur at \$480 per annum.

CLASSIFICATION.

GROUP IV.—MACHINERY.

CLASS 19.—*Steam engines.*

Fire boxes, furnaces, chimneys for boilers. Boilers, stationary, semistationary, or portable, packings and fittings for boilers. Appliances for boiler feeding, steam jacketing, antiscaling compounds, methods of purification of water. Feed water heaters, steam dryers, superheaters. Transmission of steam; joints, cocks, piping. Engines, stationary, portable, and semiportable. Valve gear. Condensers. Regulators and governors. Apparatus for lubrication. Engines moved by vapors other than steam. Methods of testing and registering steam apparatus. Association of owners of steam apparatus.

CLASS 20.—*Various motors.*

Engines operated by hot air, gas, petroleum, compressed or rarefied air, ammonia, carbonic acid gas. Parts of fittings of such machines. Hydraulic motors, wheels, turbines, water pressure engines, etc. Windmills and wind motors. Horsepowers, tumblers, spring, counterweight, and pedal motors, etc.

CLASS 21.—*General machinery.*

Apparatus for the transmission of power, shafting, pedestals, guides, jointed systems, gearing, clutches, pawls. Pulleys, belts, and cables for the transmission of power. Funicular systems. Governors and speed regulators. Lubricators. Apparatus for measuring the work of machines, counters, recorders, speed indicators, dynamometers, pressure gauges. Weighing machines. Testing machines. Meters for water or gas. Machines for moving heavy bodies, cranes, lifts, etc. Machines for raising water, hand or steam pumps, norias, hydraulic rams, etc. Fire engines and apparatus used by firemen. Hydraulic presses and accumulators. Water pipes and accessories. Air compressors and pipes. Ventilators. Transmission and distribution of power at a distance by means of water, steam, air, or vacuum. Apparatus and associations for the prevention of accidents by machinery.

CLASS 22.—*Machine tools.*

1. For working in metal. Machines working by shock, compression, or tension; steam hammers, trip hammers, drop-forging and swaging machines; machines for cutting, shearing, punching, stamping; rollers, draw benches, wire-drawing machines; machines and presses for stretching, flanging, etc.; machines for bending, butting, and welding; for riveting; for working plates (cutting, bending, rolling, edging, forming, etc.). Methods of heating, annealing, tempering, cementing, welding, and brazing in ordinary use. Tools used with the forge and with the above-named machines; anvils, beaked anvils, vises, hammers, shears, punches, dies, etc. Machines with cutting tools; lathes; machines for drilling, boring, screw cutting, milling; saws for cutting metal; machines for planing, slotting, grooving, etc. Special tools for the above machines. Vises, chucks, and accessories. Machines which use as tools such substances as grit, emery, or diamond; machines to grind, polish, sharpen; dressers. Grindstones, emery grinders, tools of corundum and diamond. Accessories of these machines and grindstones. Equipment and tools for hand work; vises, files, graving tools, taps and dies, screw plates, etc. Methods and equipment for setting out work, adjusting, checking, and testing; surface plates, beam compasses, straightedges, squares, compasses, etc.; callipers, gauges, scribing blocks, standard gauges, and instruments for testing shapes and dimensions. 2. For working in wood. Saws for felling trees, for dividing into logs, for shaping, etc. Machines for sawing lumber.

Machines for planing, turning, boring, mortising, for tonguing, and grooving; for making tenons and mortises; for shaping and copying. Machine fittings. Machine and hand tools specially fitted for working in wood. 3. Various machine tools not included in any other classification.

GROUP V.—ELECTRICITY.

CLASS 23.—*Machines for generating and using electricity.*

Apparatus for generating currents; dynamos producing continuous, alternating, or polyphase currents. Transmission of energy to a distance. Motors for continuous, alternating, or rotary field currents. Modification of currents. Motor generators. Alternating current transformers. Application to transportation; electric locomotives, electric railways. Application to mechanical purposes; elevators, winches, cranes, capstans, transfer tables, machine tools, traveling cranes. Special methods of distribution, conduits. Safety appliances and regulators.

CLASS 24.—*Electro-chemistry.*

Batteries. Accumulators. Equipment and processes generally used in electroplating and electrotyping. Production and refining of metals, or alloys. Applications to industrial chemistry; bleaching; disinfection of sewage water; sugar refining; manufacture of soda, chlorine, chlorate of potash, etc.

CLASS 25.—*Electric lighting.*

Use of continuous or alternating currents. Arc lamps. Regulators. Carbons for lamps. Incandescent lamps. Special installations; factories, public buildings, dwelling houses. Central stations. Applications to light-houses, navigation, military service, public works. Apparatus for safety and regulation. Meters. Photometry. Apparatus for determining the intensity, the distribution of illuminating power of light. Special electrical appliances; chandeliers, candelabra, ornaments, brackets, etc.

CLASS 26.—*Telegraphy and telephony.*

Telegraphic instruments, transmitters, and receivers. Multiplex apparatus. Simultaneous transmission. Various devices—relays, sounders, lightning arresters. Transmission of speech: Telephones and microphones. Telephone exchanges: Calls, annunciators, switchboards. Simultaneous telegraphy and telephony. Conduits for telegraph and telephone wires. Overhead conductors, subterranean and submarine cables.

CLASS 27.—*Various applications of electricity.*

Scientific apparatus and measuring instruments. Electricity as applied in therapeutics, surgery, and dentistry. Electric clocks. Application of electricity to railways, mines, and public works. Signals. Exploders. Indicators and recording apparatus for all kinds of natural phenomena. Electric furnaces. Electric welding. Apparatus for heating by electricity.

REVISED CATALOGUE.

GROUP IV.—MACHINERY.

CLASS 19.—*Steam engines.*

Advance Packing and Supply Company, Chicago: Gum core packing.
 Ambler Asbestos Air Cell Covering Company, New York City: Boiler and pipe covering.
 American Injector Company, Detroit, Mich.: Injector.
 American Steam Gauge Company, Boston, Mass.: Steam-engine indicator.

- American Steam Packing Company, Boston, Mass.: Steam packing.
- Ashton Valve Company, The, 271 Franklin street, Boston, Mass.: Valves for boilers, pumps, and engines; safety and relief valves; pressure and vacuum gauges.
- Ball Engine Company, The, Erie, Pa.: Automatic steam engine for electric-light and power service.
- Blake, George F., Manufacturing Company, New York City: Steam pumps.
- Bowen Manufacturing Company, Auburn, N. Y.: Dust-proof oil cups.
- Brandt, Randolph, 38 Cortlandt street, New York: Packing for steam engines; jackets for boilers.
- Burt Manufacturing Company, Akron, Ohio: Purifiers and filters for lubricating oils.
- Canfield Manufacturing Company, The, Philadelphia, Pa.: Spiral and ring packing.
- Chesterton, A. W., & Co., Boston, Mass.: Steam packing.
- Cleveland Rubber Works, Cleveland, Ohio: Steam hose.
- Clonbrock Steam Boiler Company, Brooklyn, N. Y.: Steam boilers, vertical water-tube type.
- Coale Muffler and Safety Valve Company, Baltimore, Md.: Combined pop valve and muffler.
- Crandall Packing Company, Palmyra, N. Y.: Packing.
- Crane Company, Chicago: Brass and iron valves and fittings, screwed and flanged, for wrought-iron pipe, for all pressures of steam, gas, or water; steam and gas fitters' tools, engine trimmings, etc.
- De Rycke, Joseph, New York City: Steam separators.
- Detroit Lubricator Company, Detroit, Mich. Apparatus for lubricating steam engines; "Detroit" sight-feed lubricator.
- Direct Separator Company, Syracuse, N. Y.: Steam separator.
- Dixon, Joseph, Crucible Company, Jersey City, N. J.: Lubricating graphite.
- Eagle Oil and Supply Company, Boston, Mass.: Ring packing.
- Fiske Brothers Refining Company, New York: Lubricating oils for steam engines and all kinds of machinery.
- Forbes, W. D., & Co., Hoboken, N. J.: Vertical type steam engines. One engine of 25 horsepower to be in operation direct connected to generator of Bullock Electric Manufacturing Company.
- Ford, Thomas P., New York City: Regulator valve, water valve.
- Fort Wayne Safety Valve Company, Fort Wayne, Ind.: Safety valve.
- Foster Engineering Company, Newark, N. J.: Valves.
- Goodsell Packing Company, Chicago: Rubber-back packing, flax and stitched packing for engines and steam pumps.
- Hayden & Derby Manufacturing Company, New York City: Metropolitan injectors.
- Higbee Joint Company, Philadelphia, Pa.: Pipe joints.
- Homestead Valve Manufacturing Company, Homestead, Pa.: Patent three-way cocks.
- Hoyt Metal Company, St. Louis, Mo.: Metallic packing.
- Hubbard & Co., Buffalo, N. Y.: Phoenix flue cleaner.
- Ingersoll-Sergeant Drill Company, New York City: Regulators and governors for steam engines.
- Johns, H. W., Manufacturing Company, New York: Asbestos covering for steam pipes.
- Kennedy Valve Manufacturing Company, The, New York City: Globe and check valves.
- Keystone Engineering and Manufacturing Company, Philadelphia, Pa.: Steam separator.
- Lackawanna Lubricator and Manufacturing Company, Scranton, Pa.: Grease cups.
- Lee Injector Manufacturing Company, The, Detroit, Mich.: Injectors for boiler feeding.
- Leonard & Ellis, New York: Lubricating oils for engines and machines.

- Locke Regulator Company, Salem, Mass.: Pump governing and reducing valves.
- Lunkenheimer Company, The, Cincinnati, Ohio: Brass and iron engineering appliances—valves, cocks, whistles, water gauges, injectors, and lubricating devices.
- McDondland, George T., Brooklyn, N. Y.: Steam gasket.
- Mosher, Charles D., New York City: Steam separator and grease extractor.
- Nathan Manufacturing Company, New York: Lubricators.
- New Bedford Boiler and Machine Company, New Bedford, Mass.: Boiler stop valves.
- Oil Well Supply Company, Pittsburg, Pa.: Portable boilers and engines, valves, and joints.
- Orvis & Hawkes, Chicago: Model of improved boiler furnace.
- Peerless Rubber Manufacturing Company, New York City: Steam packing and hose.
- Reid Manufacturing Company, Erie, Pa.: Patent oil cups.
- Restein, Clement & Co., Philadelphia, Pa.: Asbestos diagonal packing.
- Robins Conveying Belt Company, Park Row Buildings, New York City: Conveying machinery for feeding boilers and coal pockets; loading vessels and railroad cars.
- Schaffer & Budenberg, Brooklyn, N. Y.: Calorimeter.
- Sellers, William, & Co., Incorporated, Philadelphia, Pa.: Self-acting injector.
- Sherwood Manufacturing Company, Buffalo, N. Y.: Automatic injector, double-tube injector.
- Smoothon Manufacturing Company, Jersey City, N. J.: Compound for repairing boilers and pipes.
- Taunton Locomotive Manufacturing Company, Taunton, Mass.: Feed-water heater.
- Thorpe, Platt & Co., New York: Geipel's patent steam trap.
- United States Metallic Packing Company, Philadelphia, Pa.: Metallic packing.
- Vacuum Oil Company, Rochester, N. Y.: Lubricating oil for steam engines and machinery.
- Walworth Manufacturing Company, 14 Oliver street, Boston, Mass.: Valves, cocks, joints, piping, etc.
- Watson, N. A., Erie, Pa.: Injector.
- Watt's, John M., Sons, New York City: Packing grease and metal polish.
- Welsh Packing Company, Philadelphia, Pa.: Combination gasket.
- Wheeler Condenser and Engineering Company, 120 Liberty street, New York: Feed-water heaters, pumps, and condensers.
- Wilkinson & Co., Boston, Mass.: Oil cups.
- Winkley, F. D., Madison, Wis.: Dust-proof oil-hole covers.

CLASS 20.—*Various motors.*

- Ingersoll-Sergeant Drill Company, New York City: Engines and motors operated by compressed air.
- Meitz & Weiss, 128 Mott street, New York City: Oil engine operated by crude or volatile oils.
- Pelton Water Wheel Company, San Francisco, Cal.: Water wheels.
- Rider-Ericsson Engine Company, 22 Cortlandt street, New York: Hot-air engines.
- Smith, S. Morgan, Company, York, Pa.: Hydraulic motors, turbines for horizontal and vertical shafts.

CLASS 21.—*General machinery.*

- Allington & Curtis Company, Boston, Mass.: Dust collector and exhaust piping.
- Batcheller Pneumatic Tube Company, New York City: Air compressors and pipes. Pneumatic transmission applicable to mail, express, and freight.
- Bilgram, Hugo, Philadelphia, Pa.: Fine bevel gears.
- Bristol Company, The, Waterbury, Conn.: Special recording pressure gauges.
- Chapman Valve Manufacturing Company, Indian Orchard, Mass.: Valves and hydrants.

- Chicago Rawhide Manufacturing Company, Chicago: Rawhide pinions.
- Christensen Engineering Company, Milwaukee, Wis.: Portable automatic air compressor.
- Crane Company, Chicago: Water pipes, valves, and accessories.
- Cresson, George V., Company, Philadelphia, Pa.: Power-transmitting machinery, shafting, pedestals, etc.
- Dresser, S. R., Bradford, Pa.: Piping, joints, and accessories.
- Durant, Walter N., Milwaukee, Wis.: Automatic revolution counting device.
- Fisher Governor Company, Marshalltown, Iowa: Pump governors and reducing valves.
- Ford, Thomas P., New York City: Pump regulating and reducing valve.
- Grabner, H. S., St. Louis, Mo.: Automatic water gauge.
- Greenwood, Oliver K., Baltimore, Md.: Antifriction metal for bearings.
- Henderer's, A. L., Sons, Wilmington, Del.: Hydraulic jacks.
- Hollands Manufacturing Company, Erie, Pa.: Pipe cutters.
- Horsburgh & Scott, Cleveland, Ohio: Rawhide gears.
- Hoyt Metal Company, St. Louis, Mo.: Special "white metal" for bearings.
- Ingersoll-Sergeant Drill Company, New York City: Air and gas compressors, motors, regulators, and receiver intercoolers.
- Jeffrey Manufacturing Company, Columbus, Ohio: Conveying and elevating machinery.
- Kennedy Valve Company, New York City: Water valves.
- Lippencott Steam Specialty Company, New York City: Steam indicators.
- Locke Regulator Company, Salem, Mass.: Stop governor for steam engines.
- Ludlow Valve Manufacturing Company, The, Troy, N. Y.: Water valves, hydrants, and accessories.
- Monarch Governor and Machine Company, Indianapolis, Ind.: Governor for steam engine.
- Monarch Manufacturing Company, The, Waterbury, Conn.: Device for speed limits on engines.
- Neptune Meter Company, 253 Broadway, New York City: Water meters.
- New Process Rawhide Company, Syracuse, N. Y.: Pinions in rawhide.
- Oil Well Supply Company, Pittsburg, Pa.: Brass and iron fittings for steam, gas, water, and oil pipes.
- Olson, Tinius & Co., Philadelphia, Pa.: Testing machines, micrometer, measuring instruments, and viscosimeters.
- Rand Drill Company, New York City: Air compressors and accessories.
- Reeves Pulley Company, Columbus, Ind.: Power-transmitting devices. Wood split pulleys, clutches, speed-varying countershafts.
- Rice Gear Company, Hartford, Conn.: Gears.
- Robins Conveying Belt Company, Park Row buildings, New York City: Conveying apparatus for coal, ore, etc.
- Roots, The P. H. & F. M., Company, Connersville, Ind.: Positive pressure blower motor.
- Schaffer & Budenberg, New York: Carpenter calorimeter.
- Schieren, Charles A., & Co., 47-51 Ferry street, New York: Oak-tanned leather, finished croutons, beltings, butts, valve leather, lace leather.
- Stillwell-Bierce & Smith-Vaile Company, The, Dayton, Ohio: Electrically driven triplex pump; jet condenser.
- Stow Manufacturing Company, Binghamton, N. Y.: Flexible shaft and lathe center grinders.
- Stuarts Foundry and Machine Works, New Hamburg, N. Y.: Compression wedge coupling.
- Sturtevant, B. F., & Co., Boston, Mass.: Exhaust fans and blowers.

Tabor Manufacturing Company, Elizabeth, N. J.: Stop motion revolution counters.
 Thomson Meter Company, 79-83 Washington street, Brooklyn, N. Y.: The Lambert disk water meter, made entirely of bronze, for pipes one-half-inch to 6-inch diameter.

Torrey, H. S., 100 Broadway, New York: Special antifriction metal for bearings.

Trautvetter Brothers, Paterson, N. J.: Recording gauges.

Tripler Liquid Air Company, 121 West Eighty-ninth street, New York: System for liquefying air—processes and products.

Tyler, The, W. S., Company, Cleveland, Ohio: Passenger elevator cars in national pavilion.

Vacuum Oil Company, Rochester, N. Y.: Lubricators, oilers, dynamometers, and power-measuring devices, indicators.

Walworth Manufacturing Company, 14 Oliver street, Boston, Mass.: Water pipes and accessories.

Watson-Stillman Company, New York City: Hydraulic jack.

Worthington Pumping Engine Company, 120 Liberty street, New York City: Steam pumping machinery; water meters.

CLASS 22.—*Machine tools.*

Aeme Machinery Company, Cleveland, Ohio: Machinery for forging, cutting, and heading bolts; for tapping nuts.

Almond, Thomas R., Brooklyn, N. Y.: Drill chucks.

American Machinery Company, Grand Rapids, Mich.: Machines, hand operated, for wood trimming.

American Tool and Machinery Company, Boston, Mass.: Brass finishing lathes and tools.

American Turret Lathe Works, Wilmington, Del.: Turret lathes for heavy metal working.

Armstrong Brothers Tool Company, Chicago: Tool holders.

Atkins, E. C., & Co., Indianapolis, Ind.: Saws, tools, and sawmill specialties.

Baker Brothers, Toledo, Ohio: Keyway cutters and drill presses.

Barnes, W. F. and John, Company, Rockford, Ill.: Upright drilling machines.

Becker-Brainerd Milling Machine Company, Hyde Park, Mass.: Milling machines.

Becker, John, Fitchburg, Mass.: Milling machines.

Bement, Miles & Co., Philadelphia, Pa.: Machine tools.

Bickford Drill and Tool Company, Cincinnati, Ohio: Radial drill and multiple gear cutter.

Bowsher, N. P., South Bend, Ind.: Balancing ways for balancing revolving parts of machines.

Bradford Mill Company, Cincinnati, Ohio: Engine lathes.

Bridgeport Gun Implement Company, Bridgeport, Conn.: Augurs and bits.

Brown & Sharpe Manufacturing Company, Providence, R. I.: Milling, grinding, screw, and gear cutting machines, milling cutters, and other metal-working machine tools.

Brown, R. H., & Co., New Haven, Conn.: Reid chucks.

Buffalo Forge Company, Buffalo, N. Y.: Tool forge with blower.

Builders' Iron Foundry, Providence, R. I.: Grinding and polishing machinery.

Bullard Machine Tool Company, Bridgeport, Conn.: Boring and turning mills and turret machines.

Burr, John T., & Son, Brooklyn, N. Y.: Machine tools for metal working.

Carborundum Company, The, Niagara Falls, N. Y.: Grinding wheels.

Card, S. W., Manufacturing Company, Mansfield, Mass.: Taps and dies.

Carpenter, The J. M., Tap and Die Company, Pawtucket, R. I.: Taps and dies.

- Chicago Pneumatic Tool Company, Chicago: Pneumatic hammers, drills, riveters, boring machines, flue welders, cutters, and rollers.
- Cincinnati Milling Machine Company, The, Cincinnati, Ohio: Milling machines, universal cutters, and tool grinders.
- Cincinnati Planer Company, Cincinnati, Ohio: Machine tools.
- Cleveland Twist Drill Company, Cleveland, Ohio: Twist drills, reamers, milling cutters, etc.
- Clough, Rockwell, Company, Alton, N. H.: Automatic machines for making wire corkscrews.
- Coes, L., Wrench Company, Worcester, Mass.: Monkey wrenches.
- Coffin & Leighton, Syracuse, N. Y.: Machinists' rules.
- Curtis & Curtis, Bridgeport, Conn.: Machines for pipe cutting and threading.
- Cushman Chuck Company, Hartford, Conn.: Lathe chucks.
- D'Amour & Littledale, New York City: Power drill presses.
- Deering Harvester Company, Chicago: Automatic machines for working in metal.
- Dock, Herman, Philadelphia, Pa.: Center grinding tool.
- Doig, William S., 54-56 Franklin street, Brooklyn, N. Y.: Box-nailing machines.
- Eames, G. T., & Co., Kalamazoo, Mich.: Chucks, drill-grinder.
- Fay, J. A., & Egan Company, Cincinnati, Ohio: Wood-working, wood-sawing, and planing machinery.
- Fellows Gear Shaper Company, Springfield, Vt.: Gear shapers and cutters.
- Ferracute Machine Company, Bridgeton, N. J.: Machines for sheet-metal working.
- Flather & Co., Nashua, N. H.: Machine tools.
- Flather Planer Company, The, Nashua, N. H.: Machine tools, lathes, planers, and shapers.
- Fosdick-Holloway Machine Tool Company, Cincinnati, Ohio: Machine tools.
- Foster, Walter H., New York City: Twist-drill grinder.
- Gay & Ward, Athol, Mass.: Milling-machine cutters.
- Geometric Drill Company, New Haven, Conn.: Drills.
- Gibson, A. C., Buffalo, N. Y.: Steel stamps for marking tools.
- Gisholt Machine Company, Madison, Wis.: Machine tools, turret machines.
- Gleason Tool Company, Rochester, N. Y.: Gear planers.
- Goodell-Pratt Company, Greenfield, Mass.: Hack-saw blades.
- Gorton, George, Machine Company, Racine, Wis.: Machine tools: disk grinders, universal surface grinders.
- Gould and Eberhart, Newark, N. J.: Machine tools, shapers, and millers.
- Grant Machine Tool Works, The, Cleveland, Ohio: Machine tools for working in metal.
- Healy, William P., 515 Chamber of Commerce, Chicago: Automatic box-making machinery.
- Hendey Machine Company, Torrington, Conn.: Machine tools for metal working.
- Hilles & Jones Company, Wilmington, Del.: Metal punching and shearing machines.
- Hill, Hugh, Tool Company, Anderson, Ind.: Tool holder.
- Hoggson & Pettis Manufacturing Company, New Haven, Conn.: Scroll chucks.
- Horton, E., & Son Company, Windsor Locks, Conn.: Chucks for brass finishers; milling, grinding, and screw machines; drills, lathes, boring mills.
- Ingersoll Milling Machine Company, The, Rockford, Ill.: Heavy milling machines.
- Jones & Lamson Machine Company, Springfield, Vt.: Flat turret lathe for rapid work, with turret tools.
- Kearney & Foot, New York: Files.
- Landis Tool Company, Waynesboro, Pa.: Universal grinding machines.
- Le Blond, R. K., Machine Tool Company, Cincinnati, Ohio: Engine lathes for metal working.
- Le Count, William G., South Norwalk, Conn.: Light steel tool.

- Leisenring, John, Manufacturing Company, Belmont and Elm avenues, Philadelphia, Pa.: Machine lead screws and portable key-seating machines.
- Leland & Faulconer Manufacturing Company, Detroit, Mich.: Lathe center grinder.
- Markt & Co., New York City: Machine tools for metal working.
- Morgan Machine Company, Rochester, N. Y.: Machinery for making wooden boxes.
- Morse Twist Drill and Machine Company, New Bedford, Mass.: Twist drills, reamers chucks, milling cutters, taps and dies, mandrels, sockets, and machinists' tools.
- Morton Manufacturing Company, Muskegon Heights, Mich.: Shaping machine.
- Mossberg & Granville Manufacturing Company, Providence, R. I.: Metal press and automatic drop.
- New Haven Manufacturing Company, New Haven, Conn.: Metal planer, lathes.
- Nicholson, W. H., & Co., Wilkesbarre, Pa.: Expanding mandrels.
- Niles Tool Works Company, Hamilton, Ohio: Machine tools, lathes, planers, boring mills, and special machines.
- Norton Emery Wheel Company, Worcester, Mass.: Emery and corundum wheels, emery-wheel machinery, and specialties.
- Oesterlein Machine Company, Cincinnati, Ohio: Milling machines for metal work.
- Oneida National Chuck Company, Oneida, N. Y.: Chucks.
- Oster Manufacturing Company, Cleveland, Ohio: Adjustable threading tools for pipes and bolts.
- Owen Machine Tool Company, Springfield, Ohio: Machine tools.
- Pearl, A. Y., Rochester, N. H.: Machine tools.
- Pearson Machine Company, Chicago: Machine tools for metal working.
- Perkins Machine Company, South Boston, Mass.: Machine tools.
- Pond Machine Tool Company, Hamilton, Ohio: Machine tools for metal working.
- Potter & Johnston Company, Pawtucket, R. I.: Machine tools for metal working.
- Pratt & Whitney Company, Hartford, Conn.: Machine tools for metal working, small tools, and standards.
- Pratt Chuck Company, The, Frankfort, N. Y.: Drill chucks.
- Prentice Brothers Company, Worcester, Mass.: Drilling machinery and engine lathes.
- Prentiss Vise Company, New York: Vises.
- Q. and C. Company, Chicago: Pneumatic tools and machines for metal cutting.
- Quint, A. D., Hartford, Conn.: Vertical turret drilling machine.
- Ransom, Perry, Oshkosh, Wis.: Grinding machine.
- Reece, E. F., & Co., Greenfield, Mass.: Taps and screw plates.
- Reed, F. E., Company, Worcester, Mass.: Power lathes for working in metal.
- Rice Gear Company, Hartford, Conn.: Gear-cutting machines.
- Richardson, C. F., & Son, Athol, Mass.: Machinist level and gauges.
- Rogers, J. M., Boat Gauge and Drill Works, Gloucester City, N. J.: Gauges for measuring work.
- Sackman, F. A., Cleveland, Ohio: Steel stamps for tool marking.
- Safety Emery Wheel Company, Springfield, Ohio: Tool-grinding machine.
- Saw Company, New York: Emery wheels.
- Sawyer Tool Company, Fitchburg, Mass.: Surface gauge.
- Simonds Manufacturing Company, Fitchburg, Mass.: Saws and machine knives of all kinds.
- Skinner Chuck Company, New Britain, Conn.: Chucks.
- Slocum, J. T., & Co., Providence, R. I.: Micrometer caliper.
- Smith, H. B., Machine Company, Smithville, N. J.: Various machines for wood working.
- Springfield Machine Tool Company, Springfield, Ohio: Power lathes for metal working.

- Springfield Manufacturing Company, Providence, R. I.: Special planer type-grinding machine.
- Standard Pneumatic Tool Company, Chicago: Air plant, pneumatic drills, hammers, flue rolling, reaming, tapping and boring machines, riveters, etc.
- Standard Tool Company, The, Cleveland, Ohio: Twist drills, reamers, milling cutters, chucks, mandrels, sockets.
- Starrett, The L. S., Company, Athol, Mass: Tools for machinists, carpenters, and draftsmen; micrometers, rules, dividers, calipers, hack saws, etc.
- Stiles & Parker Press Company, Brooklyn, N. Y.: Sheet-metal working machinery.
- Sussfeld, Lorsch & Company, 27-29 Maiden Lane, New York City: Machine tools for working in metal and wood.
- T. & B. Tool Company, New Bedford, Mass. (owned by Morse Twist Drill Company): Twist drills, taps, dies, milling cutters, reamers, etc.
- Trimont Manufacturing Company, Roxbury, Mass.: Pipe cutters and wrenches.
- Trump Brothers Machine Company, Wilmington, Del.: Lathe center grinder.
- Union Manufacturing Company, New Britain, Conn.: Chucks.
- Universal Machine Company, Providence, R. I.: Machine tools.
- Vanderbeck Tool Works, Hartford, Conn.: New dividing head.
- Vitrified Wheel Company, Westfield, Mass.: Emery and corundum wheels.
- Walcott, George D., & Son, Jackson, Mich.: Shaper for iron working.
- Walker, O. S., & Co., Worcester, Mass.: Magnetic chuck; a device for holding work to the chuck by magnetism.
- Warner & Swasey, Cleveland, Ohio: Machine tools for metal working.
- Washburn Shops of the Worcester Polytechnic Institute, Worcester, Mass.: Machine tools and educational exhibit.
- Waterbury Tool Company, Waterbury, Conn.: Patent ratchet hand drill.
- Watson & Stillman, New York: Hydraulic presses.
- Wells Brothers & Co., Greenfield, Mass.: Screw plates and taps.
- Westcott Chuck Company, Oneida, N. Y.: Chucks for iron-working machines.
- Western Manufacturing Company, Springfield, Ohio: Tool holders.
- Williams, David, Company, New York: Publication—The Iron Age.

GROUP V.—ELECTRICITY.

CLASS 23.—*Machines for generating and using electricity.*

- Advance Packing and Supply Company, Chicago: Asbestos gum core packing.
- American Commercial Rubber Company, Elizabeth, N. J.: Electric insulating tape.
- American Hard Fiber Company, New York City: Insulating material.
- American Woven Wire Brush Company, Peabody, Mass.: Woven-wire dynamo brushes.
- Anderson, Albert & J. M., Manufacturing Company, Massachusetts: Quick-break switches.
- Belknap Motor Company, Portland, Me.: Chapman voltage regulator.
- Billings & Spencer Company, The, Hartford, Conn.: Switches and fuses.
- Bullock Electric Manufacturing Company, Cincinnati, Ohio: Continuous-current dynamos, motors, and appliances.
- C. & C. Electric Company, Garwood, N. J.: Electric motor.
- Chase-Shawmut Company, Boston, Mass.: Switches and fuses.
- Circular Loom Company, Boston, Mass.: Insulating tube or conduit.
- Clark, James, jr., & Co., Louisville, Ky.: Electrically driven tool grinder; electric motor.
- Commercial Electric Company, Indianapolis, Ind.: Electric motor.
- Crocker-Wheeler Electric Company, New York City: Electric motor.

- Crouse-Hinds Electric Company, Syracuse, N. Y.: Special switch for switchboard ammeters.
- Crown Woven Wire Brush Company, Salem, Mass.: Woven-wire brushes for dynamos.
- Dixon, Joseph, Crucible Company, Jersey City, N. J.: Graphite brush for motors and dynamos.
- Eck Dynamo and Motor Works, Newark, N. J.: Small motors.
- Edison Manufacturing Company, Orange, N. J.: Motors for fans, batteries, and specialties.
- Eureka Tempered Copper Works, Northeast, Pa.: Dynamo brushes, commutators.
- Garton-Daniels Company, Keokuk, Iowa: Lightning arresters for railway circuits.
- General Equipment Company, Camden, N. J.: Automatic circuit breaker.
- Hartwig & Miller, Detroit, Mich.: Boring tool for electric wiring.
- Holmes Fibre Graphite Manufacturing Company, 51-55 Wakefield street, Germantown, Pa.: Dynamo brushes.
- Insulating Staple Saddle Company, Brockton, Mass.: Insulator.
- Iron Clad Resistance Company, Westfield, N. J.: Dynamo field rheostat.
- Jeffrey Manufacturing Company, The, Columbus, Ohio, 41 Dey street, New York: Electric and air power coal cutters, drills, electric locomotives. Chain belting-steel cable, elevating, conveying machinery.
- Jenney Electric Manufacturing Company, Indianapolis, Ind.: Motors.
- Johns, H. W., Manufacturing Company, New York: Nonarcing fuses for electric circuits; mica insulators for electric transmission lines.
- K. & W. Company, Pittsfield, Mass.: Dynamo brushes.
- Kester Electric Manufacturing Company, Chicago: Fuse wire, solder, etc.
- Lakon Transformer Company, Elkhart, Ind.: Alternating current transformers.
- Locke, Fred M., Victor, N. Y.: High-voltage insulators.
- Lorain Steel Company, Lorain, Ohio: Double railway equipment; electrical railway motors, controllers, and apparatus.
- Marshall, William, New York: Electrical condensers.
- Milwaukee Electric Company, Milwaukee, Wis.: Electric motor.
- Munsell, Eugene, & Co., New York: Micanite insulation for dynamos and motors.
- New Process Rawhide Company, Syracuse, N. Y.: Rawhide pinions.
- New York & Ohio Company, Warren, Ohio: Alternating-current stationary transformers.
- Ohio Electrical Specialty Company, Troy, Ohio: Woven-wire dynamo brushes.
- Otis Elevator Company, New York: Electrically operated passenger elevators; an escalator, electrically driven.
- Patrick, Carter & Wilkins, Philadelphia, Pa.: Switches, sockets.
- Partridge Carbon Works, Sandusky, Ohio: Carbon brushes for motors and dynamos. Self-lubricating dynamo brush.
- Philadelphia Electrical and Manufacturing Company, Philadelphia, Pa.: Quick-break electric switches.
- Pittsburg Transformer Company, Pittsburg, Pa.: Transformers.
- Shaw Electric Crane Company, The, Muskegon, Mich.: Electric traveling crane and appurtenances.
- Speer Carbon Company, St. Marys, Pa.: Carbon brushes for motors and dynamos.
- Sprague Electric Company, New York: Armored conduits.
- Standard Paint Company, New York: Insulating tape.
- Steward, D. M., Manufacturing Company, Chattanooga, Tenn.: Lava insulators.
- Stow Manufacturing Company, Binghamton, N. Y.: Multispeed electric drill. Center grinder for lathe.
- Thomas, R., & Sons Company, East Liverpool, Ohio: High-voltage insulators.
- Thresher Electric Company, Dayton, Ohio: Motors.

Triumph Electric Company, Cincinnati, Ohio: Electric clocks.
 Union Porcelain Works, Brooklyn, N. Y.: Hard porcelain insulators.
 Van Wagoner & Williams Hardware Company, Cleveland, Ohio: Commutator bars.
 Vulcanized Fibre Company, Wilmington, Del.: Vulcanized fiber for insulating purposes.
 Wagner Electric Manufacturing Company, St. Louis, Mo.: Alternating-current motors, converters, and accessories.
 Western Electric Company, Chicago, Ill.: Various apparatus for generating, transmitting, and using direct and alternating current. Safety appliances, etc.
 Ward Leonard Electric Company, Bronxville, N. Y.: Rheostats; controllers; theater dimmers; automatic circuit breakers; outlet boxes.
 Westinghouse Electric and Manufacturing Company, Pittsburg, Pa.: Electric motors.
 Wirt, Charles, & Co., Philadelphia, Pa.: Dynamo brushes and rheostats.
 Zindars & Hunt, New York City: Switches and meters.

CLASS 24.—*Electro-chemistry.*

Abbott Electric and Manufacturing Company, Cleveland, Ohio: Electric cigar lighter.
 Acheson, E. C., Niagara Falls, N. Y.: Primary battery containing graphitized carbon element; electrodes for electrolytic work.
 Edison Manufacturing Company, New York: Battery cells.
 Edison, Thomas A., jr., New York: Standard battery of 8 cells.
 Gordon Battery Company, New York: Fans, water rheostats, faradic coils, batteries.
 Gould Storage Battery Company, Depew, N. Y.: Storage cells.
 Leclanche Battery Company, New York: Batteries.
 Phelps Manufacturing Company, Elmwood, Ill.: Electrical supplies.
 Reliance Lamp Electric Company, New York: Electric safety lamp and storage battery.
 Roach, William, Manufacturing Company, New York City: Standard dry batteries.

CLASS 25.—*Electric lighting.*

Adams-Bagnall Electric Company, The, Cleveland, Ohio: Arc lamps.
 Almond, Thomas R., Brooklyn, N. Y.: Electric desk lamps.
 American Electric Novelty and Manufacturing Company, New York: Two electric motors.
 American Electric Specialty Company, New York: Direct reading ohmmeters.
 Anderson, H., Peekskill, N. Y.: Hand magnet winder.
 Baker & Fox, Brooklyn, N. Y.: Focusing arc lamps.
 Bristol Company, Waterbury, Conn.: Recording volt meters and ammeters.
 Buckeye Electric Company, Cleveland, Ohio: Incandescent lamps.
 Chicago Edison Company, Chicago, Ill.: System of records and accounts for central stations.
 Chicago Fuse Wire and Manufacturing Company, Chicago: Fuse wire and fuse links.
 Columbia Incandescent Lamp Company, St. Louis, Mo.: Incandescent lamps.
 Dale Electric Company, New York: Electric sign letter.
 Electric Motor and Equipment Company, Newark, N. J.: Portable photometer, with spring rotator.
 Frink, I. P., New York: Electric fixtures and reflectors.
 General Electric Company, Schenectady, New York: Illustrations, models, and methods; views of apparatus; models made to scale of factories.
 Goehst, Henry, Chicago, Ill.: Incandescent lamp shades.
 Hardy Lamp Company, Pittsfield, Mass.: Incandescent lamps.
 Hart & Hageman Manufacturing Company, Hartford, Conn.: Snap switches.
 Hartwig & Miller, Detroit, Mich.: Boring tool for electric wiring.

- Hecla Iron Works, Brooklyn, N. Y.: Special ornamental arc-lamp posts, with accompanying post for use in connecting with railings.
- Helios-Upton Company, Peabody, Mass.: Various types of arc lamps for use on continuous and alternating current; carbons; rheostats and special converters.
- Holophane Glass Company, New York: Prism glass globes and shades for artificial lighting. Holophane patents.
- Huebel & Manger, Brooklyn, N. Y.: Electric door bells.
- Incandescent Electric Light Manipulator Company, The, Boston, Mass.: Incandescent bulb renewer and cleaner.
- Inglis, William, Wire and Iron Works, Detroit, Mich.: Wire lamp guards for incandescent lamps.
- Kinsman, F. E., New York City: Desk lamps.
- Lynn Incandescent Lamp Company, Lynn, Mass.: Incandescent lamps.
- McLeod, Ward & Co., New York: Desk lamps.
- Malcolmson, Charles T., Chicago, Ill.: Design for electric arc lamp post and accessories.
- Meyrowitz, E. B., New York: Special lamp socket and current connector.
- National Carbon Company, Cleveland, Ohio: Arc-light carbons.
- New York and Ohio Company, Warren, Ohio: Incandescent lamps.
- Oxley & Enos, Thirty-fifth street and Fifth avenue, New York City: Special electrical chandeliers.
- Paiste, H. T., Company, Philadelphia, Pa.: Porcelain sockets, cut-outs, switches, etc.
- Pass & Seymour, Syracuse, N. Y.: Porcelain cut-outs and lamp sockets.
- Perkins Switch Manufacturing Company: Rosette and switch.
- Speer Carbon Company, St. Marys, Pa.: Carbons for arc lamps.
- Syracuse Electric Instrument Company, Syracuse, N. Y.: Voltmeters.
- Tiffany Glass and Decorating Company, 333 Fourth avenue, New York: Globes, chimneys, and shades for electric lighting.
- Toerring, C. J., Company, Philadelphia, Pa.: Arc lamps for continuous and alternating currents.
- United States Carbon Company, The, Cleveland, Ohio: Cored carbons for arc lamps.
- Vought, M. I., La Crosse, Wis.: Two-ball adjuster for incandescent lamps.
- Washington Carbon Company, Washington, Pa.: Carbons for arc lamps.
- West, H. S., Chicago, Ill.: Insulated ceiling plate for arc lamps.
- Western Electric Company, Chicago: Arc lamps for both continuous and alternating current; incandescent lamps; special applications.
- White, O. C., Company, The, Worcester, Mass.: Adjustable electric-light fixtures.

CLASS 26.—*Telegraphy and telephony.*

- American Electric Telephone Company, Chicago, Ill.: Universal and express switchboards for telephones.
- American Steel and Wire Company, Worcester, Mass.: Samples of telephone and telegraph electrical and power wires and cables.
- American Wireless Telegraph Company, Milwaukee, Wis.: System of wireless telegraphy.
- Anderson, H., Peekskill, N. Y.: Hand magnet winder.
- Dicke Tool Company, Downers Grove, Ill.: Workmen's tools for aerial telephone, telegraph, and electric light wires.
- Farr Telephone and Construction Supply Company, Chicago: Telephones.
- Foot, Pierson & Co., New York: Combination telephone; lightning arresters.
- Hertzog Telesime Company, New York: New system annunciators and hotel outfits.
- Huebel & Manger Manufacturing Company, Brooklyn, N. Y.: Electric bells.
- Insulating Saddle Staple Company, Brockton, Mass.: Insulated staples.
- International Cable Directory Company, 30 Broad street, New York: Systematic code of telegraphing.

- Klein, Mathias & Son, Chicago: Tools and appliances for installing overhead and submarine conductors.
- Patrick, Carter & Wilkins, Philadelphia, Pa.: House goods.
- Pennsylvania Electric Company, Marietta, Pa.: Telephones.
- Roebling's, John A., Sons Company, Trenton, N. J.: Bare and insulated wire and underground electrical cables.
- Rowland Multiplex Telegraphic Company, 100 South Gay street, Baltimore, Md.: Multiplex synchronous telegraphy; an octoplex printing telegraph, transmitters, and receivers. Other multiplex forms of telegraphy. Devices to show operation of synchronism; maps, diagrams, photographs.
- Safety Insulated Wire and Cable Company, 223-239 West Twenty-eighth street, New York: Insulated wire.
- Sprague Electric Company, New York City: Armored conduits.
- Standard Telephone and Electric Company, Madison, Wis.: Standard wall telephone set.
- Stromberg-Carlson Telephone Manufacturing Company, Chicago: Telephone.
- Telephone Manufacturing Company, Sumter, S. C.: Telephones.
- Viaduct Manufacturing Company, Baltimore, Md.: Portable telephone set.
- Western Electric Company, Chicago: Apparatus and instruments for telephone and telegraph; telegraph relays, sounders, etc.
- Western Telephone Construction Company, 250 South Clinton street, Chicago: Telephones and apparatus for telephone exchanges, switchboards, annunciators, connectors, etc.
- Williams-Abbott Electric Company, Cleveland, Ohio: Magnets and telephone transmitters.
- Williams Electric Company, Cleveland, Ohio: Telephones.

CLASS 27.—*Various applications of electricity.*

- Abbott Electric and Manufacturing Company, Cleveland, Ohio: Electric cigar lighter.
- American Electrical Heater Company, Detroit, Mich.: Electric heaters and soldering irons.
- American Electrical Specialty Company, New York: Electrical test instruments.
- Bristol Company, The, Waterbury, Conn.: Recording volt and ampere meters.
- Dale Electric Company, New York: Electric fixtures.
- Eldridge Electric Manufacturing Company, Springfield, Mass.: Voltmeter.
- Gold Car Heating Company, New York: Apparatus for heating by electricity.
- Gordon Battery Company, New York: Electro-medical apparatus.
- Hadaway Electric Heating and Engineering Company, New York: Small electric stoves and heaters.
- Herzog Teleseme Company, New York: Variable signaling apparatus for hotel rooms; electro-chemical annunciators; telephone signals, adjuncts, and switchboards; fairy annunciators. Fortification, naval, ship, mining, railway, coast guard, postal, telephone, and telegraph installations.
- Iron Clad Resistance Company, Westfield N. J.: Field rheostats.
- Johns, H. W., Manufacturing Company, New York: Electric heaters.
- McCay Engineering Company, Baltimore, Md.: Electric heating apparatus.
- McGraw Publishing Company, 26 Cortlandt street, New York: Bound volumes and current numbers of electrical periodicals.
- Marshall, William, New York: Electrical condensers.
- Meyrowitz, E. B., New York: Electro-magnet for abstracting metallic substances from the human eye.
- Norton Electrical Instrument Company, Manchester, Conn.: Electrical measuring instruments.
- Queen & Co., Philadelphia, Pa.: Scientific apparatus—measuring instruments, voltmeters, ammeters, various standards for alternating and continuous currents.

Sempire Clock Company, St. Louis, Mo.: Electrical clocks.

United Electric Heating Company, Detroit, Mich.: Electric heating apparatus.

Wagner Electric Manufacturing Company, St. Louis, Mo.: Electric measuring instruments.

Weston Electrical Instrument Company, Newark, N. J.: Scientific apparatus—measuring instruments, voltmeters, ammeters, various standards for alternating and continuous currents.

KEY AND TITLES TO ILLUSTRATIONS AND VIEWS.

D-1. Machinery annex building, Bois de Vincennes.

D-2. Oil-well and windmill exhibit, Bois de Vincennes.

D-3. Interior machinery annex, Bois de Vincennes, showing general style of installation and traveling crane.

D-4. Interior view machinery annex, Bois de Vincennes.

D-5. Section of general machine-tool exhibition, Bois de Vincennes.

D-6. Section of general machinery installation, department of machinery and electricity, Champ de Mars.

D-7. Section general machinery installation, department of machinery and electricity, Champ de Mars.

D-8. View of general installation of machinery and machine tools, Champ de Mars.

D-9. View of general installation of electrical apparatus and supplies, department of machinery and electricity, Champ de Mars, first floor.

D-10. View in electrical installation, department of machinery and electricity, ground floor, Champ de Mars.

D-11. West façade Salle d'Honneur, department of machinery and electricity, first floor, Champ de Mars.

D-12. North aisle (and its entrance through façade) Salle d'Honneur, department of machinery and electricity, first floor, Champ de Mars.

D-13. Interior of façade and Salle d'Honneur, department of machinery and electricity, first floor, Champ de Mars.

KEY TO INSTALLATION, CHAMPS DE MARS.

[See plan of installation of Groups IV and V.]

1. System of pneumatic transmission, tubes, machinery, and accessories. Batchelor Pneumatic Tube Company, New York.

2. Hot air engines, etc. Rider-Ericsson Engine Company, New York.

3. Multiplex printing telegraph system and appliances. Rowland Telegraphic Company, Baltimore, Md.

4. Water meters. Thomson Meter Company, Brooklyn.

5. Valves and fittings. Chapman Valve Manufacturing Company, Indian Orchard, Mass.

6. Safety and relief valves, pressure and vacuum gauges. Ashton Valve Company, Boston.

7. Upright drilling machines. W. F. & John Barnes Company, Rockford, Ill.

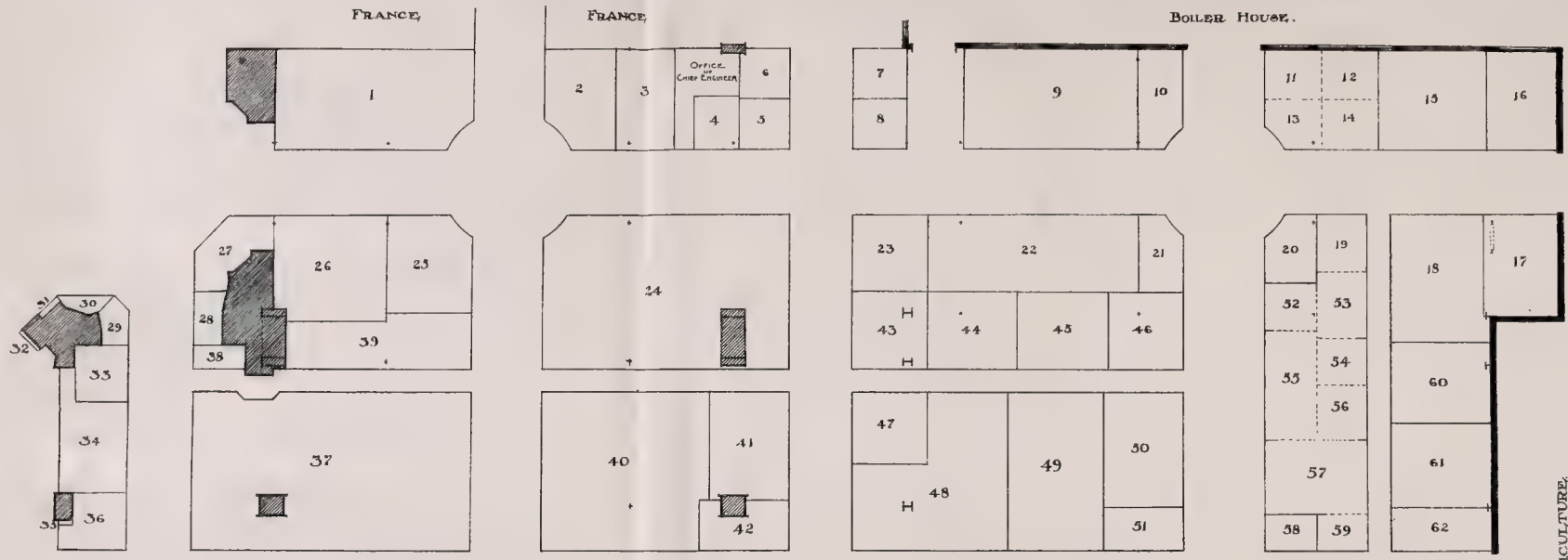
8. Twist drills, reamers, chucks, milling cutters, machinists' tools, etc. Morse Twist Drill and Machine Company, New Bedford, Mass.

9. Machine tools, automatic machine tools, instruments of precision, etc. Brown & Sharpe Manufacturing Company, Providence, R. I.; Pratt & Whitney Company, Hartford, Conn.; Bullard Machine Tool Company, Torrington, Conn.; Builders' Iron Foundry, Providence, R. I.; F. E. Reed Company, Worcester, Mass. Machine tools, etc. Prentice Bros. & Co., Worcester, Mass.

10. Instruments of precision, fine tools, etc. Brown & Sharpe Manufacturing Company, Providence, R. I.

11. Gear planers. Gleason Tool Company, Rochester, N. Y.

12. Machine tools. Office of Fenwick Frères, agents, Paris, France.



PARIS EXPOSITION OF 1900.

PLAN OF INSTALLATION IN UNITED STATES SPACE.

GROUND FLOOR OF PALACE OF MACHINERY AND ELECTRICITY.

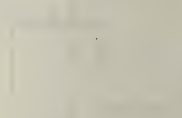
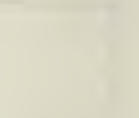
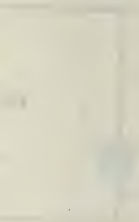
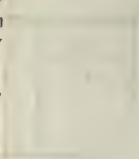
GROUPS IV & V.

Scale of Feet

Sheet 1

Sheet 2

Sheet 3



Sheet 1

Sheet 2

Sheet 3

13. Emery and corundum wheels. Norton Emery Wheel Company, Worcester, Mass.
14. Chucks, machine tools, etc. E. Horton & Sons Company, Windsor Locks, Conn.
15. Insulated wires and cables. John A. Roebling's Sons Company, Trenton, N. J.
16. Leather belts, etc. Charles A. Schieren & Co., New York.
17. Brass-finishing lathes and tools; machine tools. American Tool and Machinery Company, Boston, Mass.; Gould & Eberhardt, Newark, N. J.
18. Appliances for liquefying air. Tripler Liquid Air Company, New York.
19. Machine tools. Potter & Johnson Company, Pawtucket, R. I.
20. Drills, reamers, mandrils, etc. Standard Tool Company, Cleveland, Ohio.
21. Twist drills, taps and dies, etc. Cleveland Twist Drill Company, Cleveland, Ohio.
22. Machine tools. Niles Tool Works Company, Hamilton, Ohio; Pond Machine Tool Company, Hamilton, Ohio; Bement-Miles Company, Philadelphia, Pa.
23. Machine tools. Warner & Swasey, Cleveland, Ohio.
24. Model of works, photographs, electrical machinery and installations. General Electric Company, Schenectady, N. Y.
25. Saws; knives for machines. Simonds Manufacturing Company, Fitchburg, Mass.
26. Testing machines. Tinius Olsen & Co., Philadelphia.
27. Lubricating oils. Fiske Brothers Refining Company, New York, N. Y.
28. Rubber gaskets and packing. Peerless Rubber Manufacturing Company, New York.
29. Machine tools. Office of De Fries & Co., agents, Paris, France.
30. Machine tools. Fosdick & Holloway Machine Tool Company, Cincinnati, Ohio.
31. Tool holders. Hugh Hill Tool Company, Anderson, Ind.
32. Switches and fuses. Billings & Spencer Company, Hartford, Conn.
33. Welding machines. Standard Tool Company, Cleveland, Ohio.
34. Valves, fittings, and pipe tools. Walworth Manufacturing Company, Boston, Mass.
35. Files. Kearney & Foote, New York.
36. Lubricating oils. Leonard & Ellis, New York.
37. Electric lamps, telephone apparatus and installation, motors and dynamos, etc. Western Electric Company, Chicago.
38. Antifriction metal. Glacier Anti-Friction Metal Company, New York.
39. Phonographs, primary batteries, etc. Edison Manufacturing Company, Orange, N. J.
40. Dynamos, motors, controllers, etc.; street railway motors and equipment. Bullock Electric Manufacturing Company, Cincinnati, Ohio; Lorain Steel Company, Lorain, Ohio.
41. Air compressors. Ingersoll-Sergeant Drill Company, New York.
42. Condensers, electrically driven pumps. Stillwell-Bierce & Smith-Vaile Company, Dayton, Ohio.
43. Machine tools. Gisholt Machine Company, Madison, Wis.
44. Steam pumps, copper pipe, machine tools, etc. Glaenger & Perraud, agents, George G. Blake Manufacturing Company, New York; Chicago Pneumatic Tool Company, Chicago, etc.
45. Automatic machine tools. Deering Harvester Company, Chicago.
46. Machine tools and presses. Ferracute Machine Company, Bridgeton, N. J.
47. Pneumatic tools. Chicago Pneumatic Tool Company, Chicago.
48. Machine tools and presses. E. W. Bliss Company, Brooklyn.
49. Woodworking machinery. J. A. Fay & Egan Company, Cincinnati, Ohio.
50. Valves and fittings, etc. Crane Company, Chicago.
51. Water meters. Neptune Meter Company, New York.

52. Pneumatic tools. Standard Pneumatic Tool Company, Cleveland, Ohio.
53. Power lathes; heavy milling machines. Springfield Machine Tool Company, Springfield, Ohio; the Ingersoll Milling Machine Company, Rockford, Ill.
54. Milling machines. Becker & Brainerd Milling Machine Company, Hyde Park, Mass.
55. Milling machines, universal cutters, etc.; universal grinding machines. The Cincinnati Milling Machine Company; Landis Tool Company, Waynesboro, Pa.
56. Machine tools. Office of Adolph Janssens & Co., agents, Paris.
57. Bolt-making machinery; machine tools. Acme Machinery Company, Cleveland, Ohio; Flather & Co., Nashua, N. H.
58. Machinists' tools, micrometers, etc. The L. S. Starrett Company, Athol, Mass.
59. Woodworking machinery. American Machinery Company, Grand Rapids, Mich.
60. Air compressors and accessories. Rand Drill Company, New York.
61. Machine tools. Markt & Co., agents, New York.
62. Hydraulic motors, turbines, etc., water wheels. S. Morgan Smith Company, York, Pa.; Pelton Water Wheel Company, San Francisco, Cal.
63. Injectors and lubricators, valves, fittings, etc. Lunkenheimer Company, Cincinnati, Ohio.
64. Box-making machinery. William S. Doig, Brooklyn.
65. Woodworking machinery. H. B. Smith Machine Company, Smithville, N. J.
66. Pneumatic tools. Q. & C. Company, Chicago.
67. Machine tools, box-making machinery. Sussfield, Lorsch & Co., New York.
68. Automatic corkscrew machinery. Rockwell Clough Company, Alton, N. H.

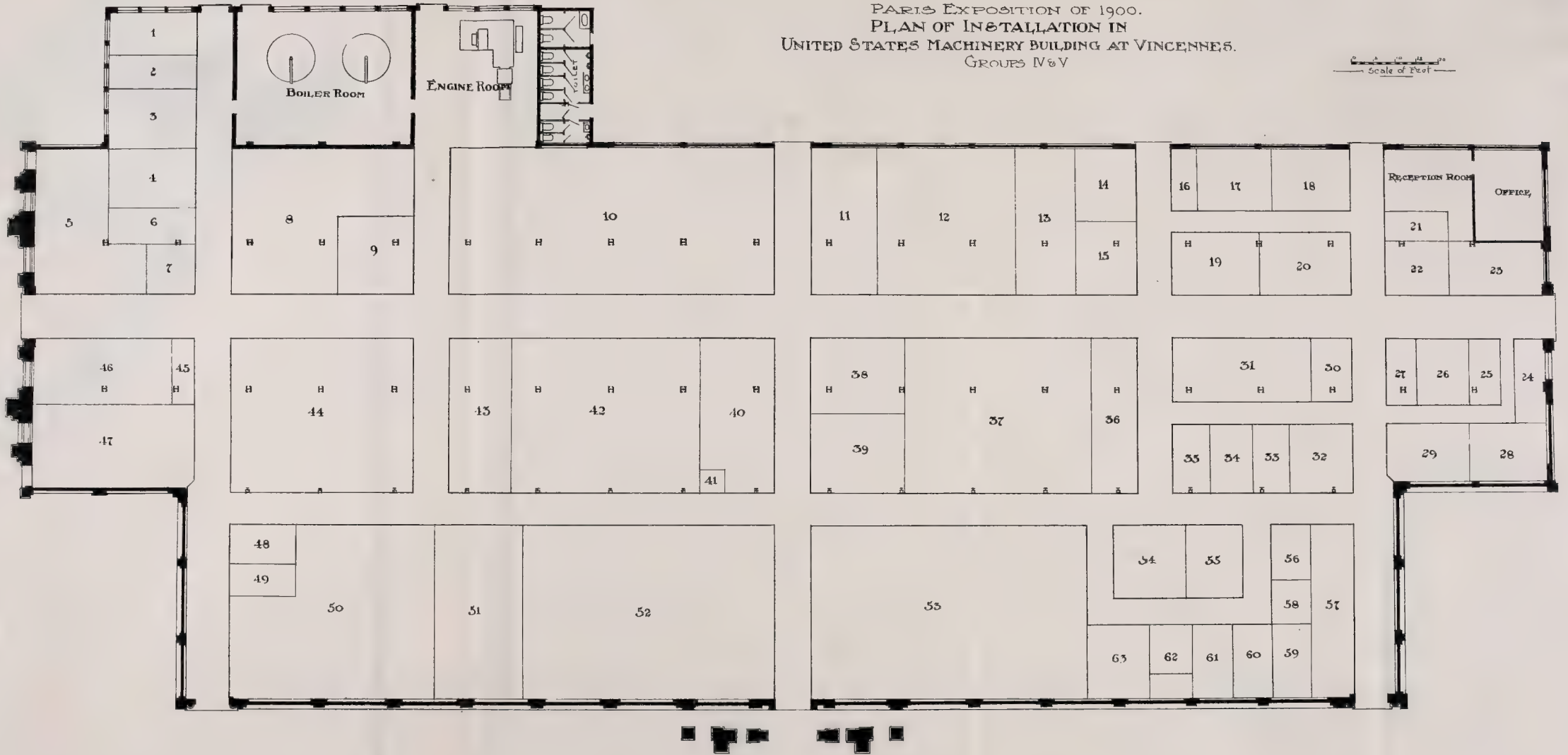
KEY TO INSTALLATION, ANNEX AT VINCENNES.

[See plan of installation of Groups IV and V.]

1. Charging station for automobiles.
2. Water wheels. Pelton Water Wheel Company, San Francisco.
3. Machine tools. R. K. Le Blond Machine Tool Company.
4. Machine tools, pneumatic tools. Le Blond Machine Tool Company, Cincinnati, Ohio; Q. & C. Co., Chicago, Ill.
5. Special steel tools. Bethlehem Steel Company, Bethlehem, Pa.
6. Lubricating oils. Vacuum Oil Company, Rochester, N. Y.
7. Mining machinery. M. C. Bullock Manufacturing Company, Chicago.
8. Air compressors, rock drills, mining machinery. Rand Drill Company, New York.
9. Mining machinery, conveying machinery, elevators, etc. Jeffries Manufacturing Company, Columbus, O.
10. Machine tools. Bement, Miles & Co., Philadelphia; Niles Tool Works Company, Hamilton, Ohio; Pond Machine Tool Company, Hamilton, Ohio.
11. Pneumatic tools. Chicago Pneumatic Tool Company, Chicago, Ill.
12. Machine tools. Markt & Co., agents, New York.
13. Machine tools. Adolph Janssens & Co., agents, Paris.
14. Leather machinery. American Tool and Machine Company.
15. Grinders. Landis Tool Company.
16. Pneumatic tools. Standard Pneumatic Tool Company, Cleveland, Ohio.
17. Milling machines. Becker & Brainerd.
18. Machine tools. Mark Flather Company.
19. Milling machines, universal cutters, etc. Cincinnati Milling Machine Company, Cincinnati, Ohio.
20. Presses. Ferracute Machine Company, Bridgeton, N. J.
21. Saws and knives. Simonds Manufacturing Company, Fitchburg, Mass.

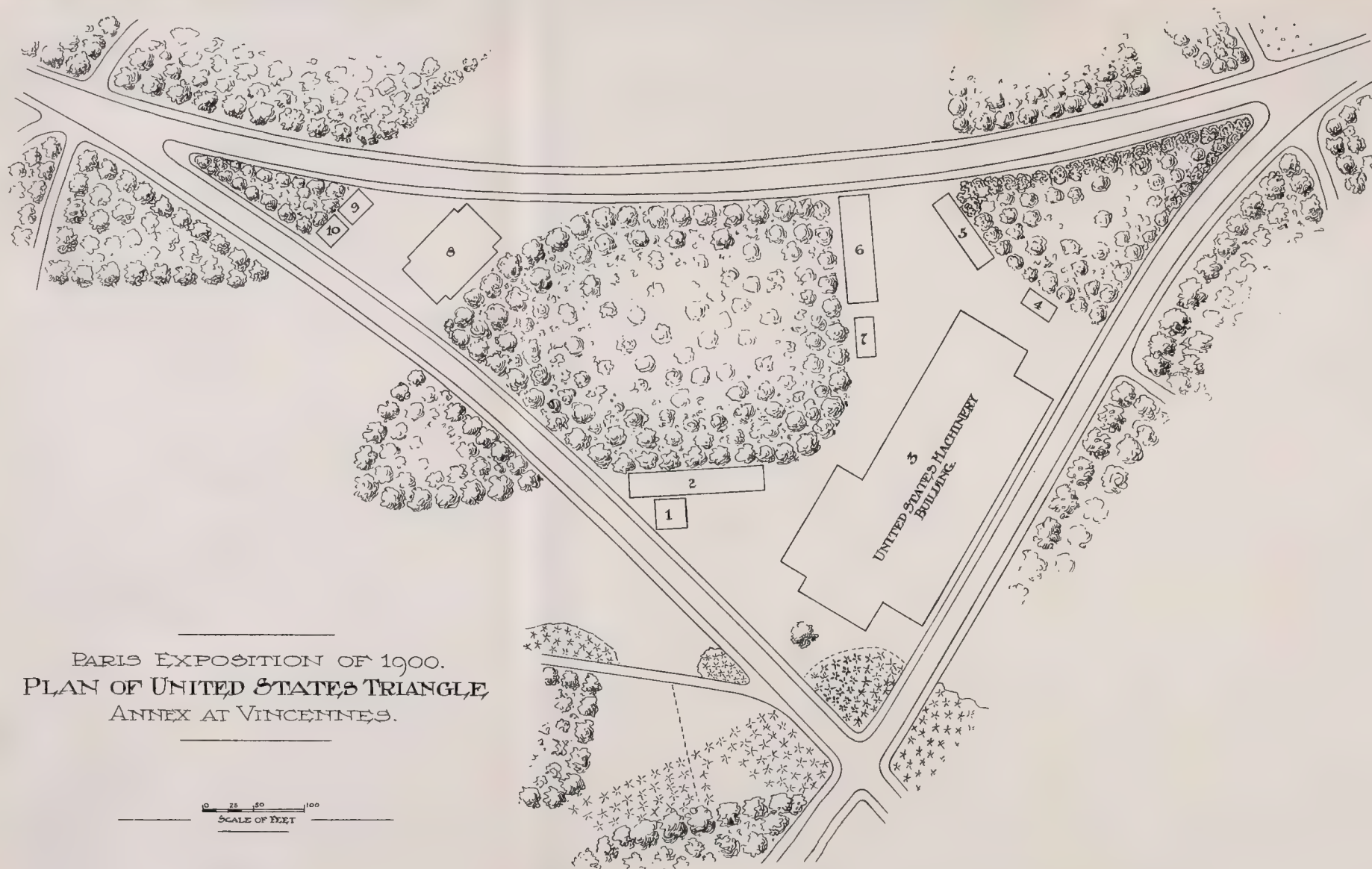
PARIS EXPOSITION OF 1900.
 PLAN OF INSTALLATION IN
 UNITED STATES MACHINERY BUILDING AT VINCENNES.
 GROUPS IV & V

0 10 20 30 40
 Scale of Feet



PARIS EXPOSITION OF 1900.
PLAN OF UNITED STATES TRIANGLE,
ANNEX AT VINCENNES.

0 25 50 100
SCALE OF FEET





22. Machine tools. Ingersoll Milling Machine Company, Rockford, Ill.
23. Bolt-making machinery. Acme Machinery Company, Cleveland.
24. Machine tools. Machinery tool exhibit, represented by Fenwick Frères.
25. Wooden pulleys. Reeves Pulley Company.
26. Emery and corundum wheels. Norton Emery Wheel Company, Worcester, Mass.
27. Fine tools. L. S. Starrett Company, Athol, Mass.
28. Machine tools. Office, Fenwick Frères, Paris.
29. Grinding and polishing machinery. Builders' Iron Foundry, Providence, R. I.
31. Machine tools. Gisholt Machine Company, Madison, Wis.
32. Lubricating oils. Fiske Bros. Refining Company, New York.
33. Machine tools. Fosdick & Holloway, Cincinnati, Ohio.
34. Upright drilling machines. W. F. & John Barnes Company, Rockford, Ill.
35. Gear planers. Gleason Tool Company, Rochester, N. Y.
36. Lathes. F. E. Reed Company, Worcester, Mass.
37. Automatic machine tools, fine tools, and instruments of precision, etc. Brown & Sharpe Manufacturing Company, Providence, R. I.
38. Lathes. F. E. Reed Company, Worcester, Mass.
39. Machine tools. Hendey Machine Company, Torrington, Conn.
40. Boring mills, machine tools. Bullard Machine Tool Company, Bridgeport, Conn.
41. Drills. Morse Twist Drill Company.
42. Machine tools, fine tools, and instruments of precision, etc. Pratt & Whitney Company, Hartford, Conn.
43. Machine tools. Warner & Swasey, Cleveland, Ohio.
44. Air compressors, mining machinery, etc. Ingersoll-Sergeant Drill Company, New York.
45. Milling machinery. Gould & Eberhardt.
46. Machine tools. Fellows Gear Shaper Company; Jones & Lamson Machine Company, Springfield, N. H.
47. Woodworking machinery. H. B. Smith Machine Company, Smithville, N. J.
- 48, 49. Machine tools. Sussfeld & Lorch Cie.
50. Machine tools, presses, etc. E. W. Bliss Company, Brooklyn.
51. Machine tools. De Fries & Co., agents, New York.
52. Woodworking machinery. J. A. Fay & Egan Company, Cincinnati, Ohio.
53. Compress. Indo-Egyptian Compress Company, Boston, Mass.
57. Lathes. Springfield Machine Tool Company, Springfield, Ohio.
64. Electric generator. Bullock Electric Manufacturing Company, Cincinnati, Ohio.
65. Tandem compound engine. Ball Engine Company, Erie, Pa.
66. Steam feed pump. Geo. F. Blake Manufacturing Company, New York.
67. Feed-water heater. Taunton Locomotive Manufacturing Company, Taunton, Mass.
68. Injector for boiler feeding. Lee Injector Manufacturing Company, Detroit, Mich.
- Morrin climax boilers. Clonbrock Steam Boiler Company, Brooklyn.
69. Machine tools. Jones & Lamson Machine Company, Springfield, N. H.; Fellows Gear Shaper Company, Springfield, N. H.
70. Automatic box-making machinery. William P. Healy, Chicago.
71. System of piping, connections, etc. S. R. Dresser, Bradford, Pa.
72. Brass-finishing lathes and tools. American Tool and Machinery Company, Boston, Mass.
73. Saws. E. C. Atkins & Co., Indianapolis.
74. Belt-conveying machinery. Robins Conveying Belt Company, New York.

KEY TO INSTALLATION, UNITED STATES TRIANGLE, BOIS DE VINCENNES.

[See plan of installation of Groups IV and V.]

1. Aermotor. Aermotor Company, Chicago.
2. Artesian wells, machinery, and appliances. Oil Well Supply Company, Pittsburgh, Pa.
3. Machine tools, mining machinery, pneumatic tools, air compressors, etc. United States machinery building.
4. Shooting gallery. Smith & Wesson, Springfield, Mass.
5. Model of belt-conveying installation. Robins Conveying Belt Company, New York.
6. Agricultural implements. McCormick Harvesting Machine Company, Chicago.
7. Section of ship. Chicago Pneumatic Tool Company, Chicago, Ill.
8. Bicycle building. Exhibits of bicycles.
9. Incubators. Reliable Incubator and Brooder Company, Quincy, Ill.
10. Windmills. Stover Manufacturing Company, Freeport, Ill.

KEY TO PLAN OF INSTALLATION SALON D'HONNEUR.

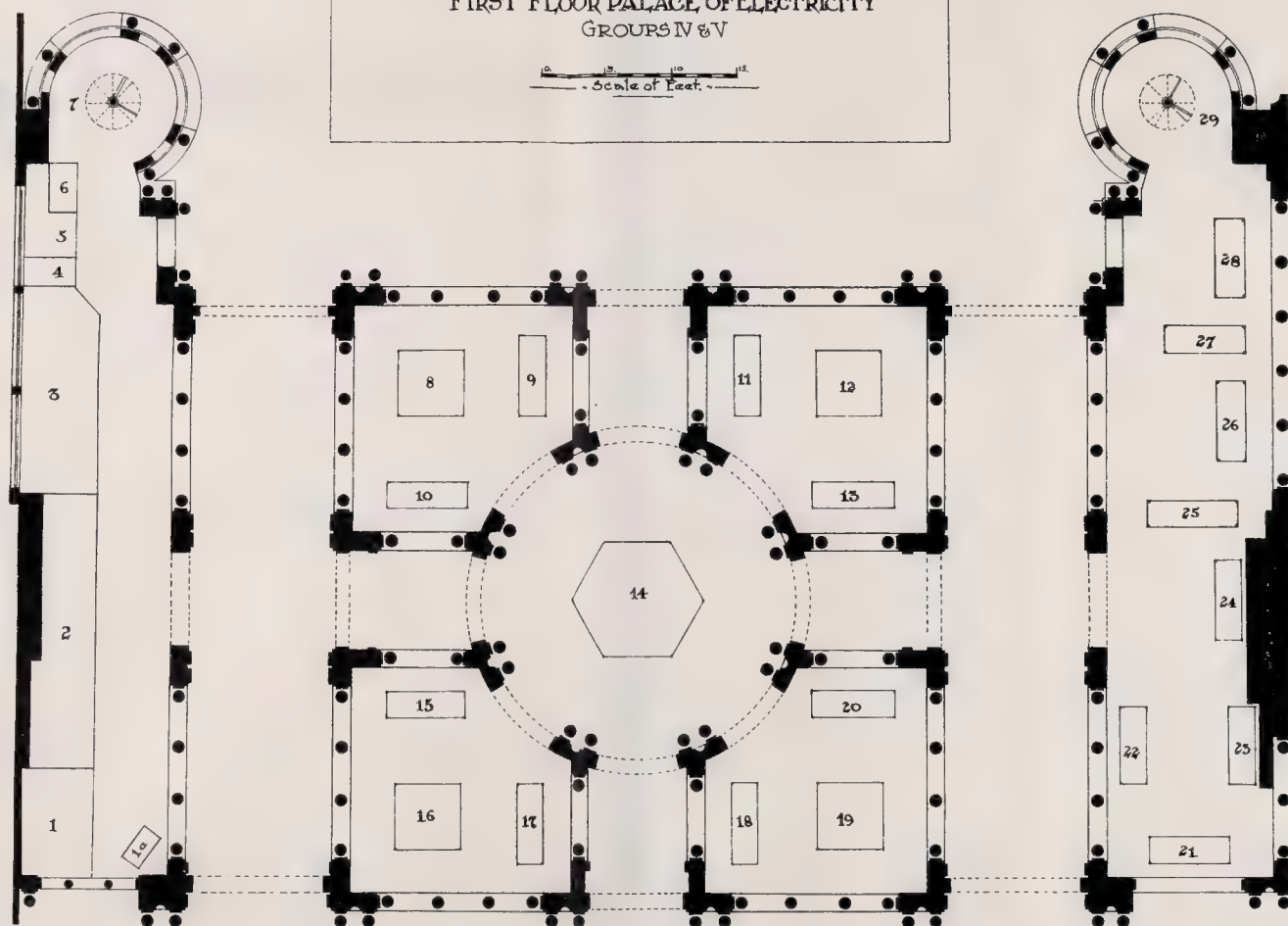
1. Electric car "Joseph Henry."
2. Series of four street railway motors, illustrating development of electric traction.
3. Edison's Menlopark electric locomotive.
4. Edison generator first used for ship lighting.
5. Early electric controlling devices for street cars.
6. Van der Poel electric motor for street car.
7. Collection of photographs illustrating street railway development in the United States, prepared by S. H. Short.
8. Various forms of early electric motors.
9. Primary batteries.
10. Early experimental models of Henry, Farmer, Maxim, etc.
11. Early telegraphic instruments.
12. Franklin cylinder electrical machine and early types of magneto-electrical machines.
13. Historical exhibit of telephones.
14. Exhibit of photographs, relics, early advertising matter pertaining to the electrical industry.
15. Historical forms of arc lamps.
16. Early forms of incandescent lighting, including lamps, chandeliers, switches, etc.
17. Early arc-light generators and lamps of Brush and Thomson.
18. Experimental form of switches, lamps, cut-outs, and magneto-electrical apparatus.
19. Arc lighting, including battery lamps and early forms of nonautomatic arc lamps.
20. Historical exhibit of electrical measuring instruments.
21. United States Patent Office models, wood-working machinery.
22. United States Patent Office models, metal-working machinery.
23. United States Patent Office models, metal-working machinery.
24. United States Patent Office models, metal-working machinery.
25. United States Patent Office models, injectors for steam engines.
26. United States Patent Office models, gas, hot-air, and vapor engines, valve motions, etc.
27. United States Patent Office models, steam engines.
28. United States Patent Office models, steam engines and accessories.
29. Exhibit of record systems used by the Chicago Edison Company, Chicago, Ill., and arranged by W. M. Anthony, comptroller of that company.

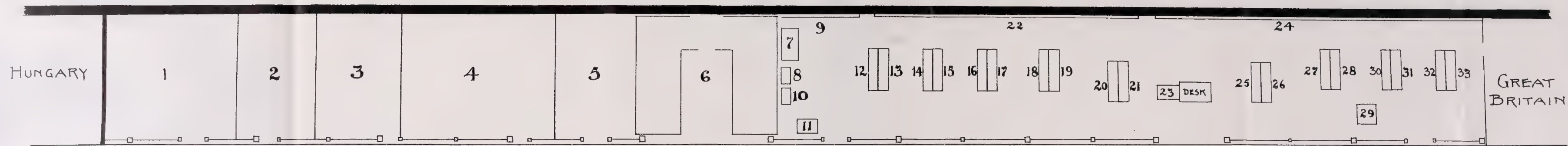
GERMANY

GERMANY

PARIS EXPOSITION OF 1900
PLAN OF INSTALLATION IN UNITED STATES SPACE,
HALL OF HONOR
FIRST FLOOR PALACE OF ELECTRICITY
GROUPS IV & V

0 5 10 15
- Scale of Feet -





PARIS EXPOSITION OF 1900
 PLAN OF INSTALLATION OF UNITED STATES
 COLLECTIVE EXHIBIT OF MACHINERY & ELECTRICITY
 FIRST FLOOR OF PALACE
 GROUPS IV & V

0 5 10 15
 SCALE OF FEET

January

1

2

1929-30
COLLECTIVE

DIRECTOR'S NARRATIVE.

NEW YORK, *January 4, 1901.*

SIR: In pursuance of my duty as director of the department of machinery and electricity for the United States Commission to the Paris Exposition of 1900, I have the honor to transmit the following report, covering the organization and administration of the department which, under the regulations of the Commissioner-General, covers Groups IV and V of the official French classification. Only a record of the important steps taken and a general description of the work of the department has been undertaken, as a full detailed report for the past twenty-seven months would be too voluminous to be useful for general reference.

On August 19, 1898, while in conference in Chicago, your director was requested to accompany you on your contemplated trip to Paris, for the purpose of examining and reporting upon the general situation in which the machinery and electrical interests were concerned. Later the department of machinery and electricity was definitely designated by the appointment, on September 10, 1898, of the director of machinery and electricity, this being the second department to be officially named by you.

Before leaving Chicago you had instructed the director to carry as records all plans and official space notices which up to that date had been received from the French administration. These plans and the evident lack of space were the subject of frequent conferences at the staff meetings held en route to Paris.

Your director realized before arriving in Paris that with very meager plans of floor space and no sectional or detailed drawings of the palaces the manufacturers of machinery in the United States would be at great disadvantage. This was so more particularly on account of the length of time required to correspond with Paris concerning technical questions which must be faced before allotting space and installing exhibits.

Upon the organization of your exhibit staff (immediately after arrival in Paris) your director of machinery and electricity was named as chairman of a committee on plans, whose duty it should be to hasten the acquirement of all space and building plans and to have the same

duly traced and translated for the advancement of the general work. In following this labor closely your director was present at practically all of the interviews and conferences at the headquarters of the Exposition administration.

THE SPACE PROBLEM.

In spite of your repeated and successful efforts to secure more space for the United States, the official allotments for Groups IV and V in the main palace of machinery and electricity could not be augmented, as all other nations participating had received and accepted their spaces, making the expansion of this department impossible. Your director was confronted with the serious problem of caring for all exhibits covered by classes 19 to 27, inclusive, on three exhibit spaces aggregating approximately 48,000 square feet, gross area, which included the space required for aisles and passageways. The three spaces were separated from one another by a distance of several hundred feet, the largest having an approximate gross area of 38,500 square feet, situated on the ground floor of the palace of electricity (immediately joining the French section, as shown in our record plans), the other two spaces being on the gallery or first floor. The larger of the latter two sections contained a gross area of 5,000 square feet and occupied a conspicuous position in that section of the palace which had been officially designated the "salon d'honneur," where it was intended that the best examples of the work of the world's inventors and investigators in the science of electricity should be displayed. The smaller space, approximately 4,500 square feet, was a less desirable section in a narrow but prominent gallery on the south side of the large bay devoted to the power plant of the foreign exhibitors. For convenience in referring to the departmental space on the Champ de Mars these spaces were designated "ground-floor space," "salon d'honneur," and "gallery space." Owing to the physical conditions governing the space in the salon d'honneur and gallery it was apparent that nothing but light exhibits could be placed in either one. This left the ground-floor space, a net area of 22,000 square feet, to accommodate all heavy and important exhibits in the classes of steam, hydraulic, pneumatic, general transmitting, and electrical machinery, and machines for working in metal and wood.

With our recognized superiority in the line of machine tools and electrical machinery, this ground floor space seemed ridiculously inadequate to permit the installation of a representative exhibit in these two classes, to say nothing of the other seven classes involved. All appeals for enlargement of the space proved unavailing, however, so that your director began the formation of plans for the exhibit.

The ground floor space was badly located for the accommodation of heavy and bulky machinery, there being a gallery floor above two-thirds or the area, with no provision whatever for traveling cranes. The

space which could have been utilized for the installation of such machinery, requiring solid foundations, was not greater than 2,000 square feet.

Immediately after the return of your director to the United States the examination of applications for space (received by the special commissioner, the late Moses P. Handy, and those received during your absence in Paris) was made. The total space asked for in the bona fide applications of record was several times greater than the space at the command of the department, even though it was evident from this examination that many of the important industries were not represented, owing to the early date and lack of published information concerning the Exposition.

PROPOSITION TO FURNISH POWER FOR EXPOSITION.

During the visit to Paris the French administration had furnished to your director copies of the regulations and contract forms governing the participation in the supplying of units for the required power plant of the Exposition. The department now immediately entered into correspondence with our largest builders, with the idea of securing a combined engine and generator unit of from 5,000 to 6,000 horsepower. Such discouragement was met with, however, that the idea had to be abandoned. The only unit of this size available had been ordered by one of the large traction companies of New York, which refused to loan it for what meant a period of eighteen months, including the time spent in preparation and transportation, the period of its exposition, and its return to the United States.

Another very serious difficulty to be overcome in planning this installation of a colossal engine and dynamo was the regulation of the administration that a foreign country furnishing electrogene groups or units must also supply the boilers necessary to produce the steam for such units. As our boiler makers can not successfully compete in price with European builders, after paying duty and freight, there appeared no commercial incentive for American boiler makers to put forth any efforts for an exhibit in this connection.

ASSISTANT DIRECTOR APPOINTED.

The large number of prospective exhibitors in the East and the difficulties in the way of disseminating full information by letter and personal interview without an Eastern representative of the department caused your director to recommend the appointment of an assistant director of machinery and electricity, with headquarters in New York at the offices of the commission, 120 Broadway. Mr. James S. Anthony was chosen for this position, and later there was intrusted to him considerable of the correspondence and many details of negotiations with Eastern exhibitors.

RETROSPECTIVE EXHIBITS.

During the few weeks preceding the close of the year 1898, after studying carefully the probable exhibits throughout the nine classes in the range of the department, your director presented for your approval a plan for a complete historical electrical and mechanical exhibit, following the lines of the French classification, which provided for the retrospective exhibits of the arts and sciences for the century about to close. This recommendation proposed the setting apart of the 5,000 square feet in the salon d'honneur for a museum of science which should show by means of original apparatus or models the part played by American genius in the mechanical and electrical fields. Your consent to the plan was immediately granted. The important work of selecting and preparing this retrospective exhibit was intrusted to Assistant Director Anthony, who carried it out with signal success, as recorded in his instructive and interesting report of the collection, which is hereto annexed.

SPACE DEMANDS AND SUPPLY.

In classifying the applications for space it was found that requests from manufacturers of machines for working in metal and wood (class 22) were far more numerous than those received from other interests, the former being a line of machinery purchased in great quantities by European manufacturers. The modern machine tool is distinctly American, and the whole world acknowledges our preeminence in this industry. Ninety per cent of the applications in this class emanated from responsible companies or firms having previously exploited the European markets, or those desiring to extend their markets. The next in order of importance were from the manufacturers of electrical apparatus and miscellaneous machines, respectively.

Many trips to important manufacturing centers were made by your director for the purpose of consultation with principals to ascertain the exact attitude of the applicants with reference to the size and scope of their proposed exhibits. The result of these interviews and the departmental correspondence was laid before the director in chief of exhibit departments and finally referred to you as showing the difficulties in the way of a satisfactory allotment of an aggregate available exhibit space of approximately 26,500 square feet (excluding the salon d'honneur) to serious applicants for over 100,000 square feet.

A very serious problem was here presented for solution. The department had three alternatives of procedure—either to secure more space, to choose a very few of the best-known firms in their various lines to the exclusion of all others (which would have been manifestly unjust to those who were refused space), or to cut down the allotment of all to dimensions which would deprive most of the exhibitors of their expected benefits by reason of inadequate representation.



D-1. MACHINERY ANNEX BUILDING, BOIS DE VINCENNES.

SPECIAL MACHINERY BUILDING FOR THE UNITED STATES IN BOIS DE VINCENNES SUGGESTED.

Searching for some solution of this vexing situation, your director turned his attention to the study of the proposed annex to the Exposition at the Bois de Vincennes, which according to a decree had been established for the accommodation of such exhibits as railway rolling stock and track materials, automobiles, bicycles, athletic sports, etc. In the estimation of your director the railroad, automobile, and bicycle industries in Europe are among the largest purchasers of machine tools, and following this deduction we conceived the idea of securing space in the Vincennes annex grounds for a machinery building which would contain operating machinery and working exhibits, particularly in the machine-tool line. After elaborating to some extent this project it was presented to the director in chief of exhibit departments and to yourself for consideration and approval.

IDEA APPROVED BY COMMISSIONER-GENERAL—VISIT TO PARIS TO SECURE SPACE.

Your consideration having been favorable to the principle involved, your director was instructed to proceed to Paris, sailing March 9, 1899, for the purpose of securing the necessary concession from the administration for the building. Combined with this mission were many others concerning the various departments, the most important perhaps being an electrical tramway concession connecting the Bois de Vincennes with the terminus of the steamboat line on the river Seine.

IDEA APPROVED BY MACHINERY EXPERTS.

While in Paris awaiting a definite response concerning the space required at Vincennes for a machinery building, your director consulted the European representatives of the most important American machine-tool builders as to the feasibility of the project. The query put to them was, "Will the people interested in our machinery visit the exhibit at a distance of $6\frac{1}{2}$ miles from the main Exposition?" With one exception these agents approved the plan, promising their active cooperation in making the affair a success.

SPACE FOR BUILDING GRANTED.

In April, 1899, the French administration granted a space 80 by 250 feet at Vincennes for the building, but could not at that time give a definite location for it. Your director sailed immediately for New York, arriving on May 2. Proceeding to Chicago for conference with you, your director presented the completed plan under which the building and its administration was to be carried out.

COST OF MACHINERY BUILDING TO BE SHARED BY EXHIBITORS.

As the budget of the department was entirely inadequate to defray the cost of the erection and maintenance of such an enterprise, it was proposed by your director to place the matter before the probable exhibitors in class 22 for their opinion and decision. Accordingly all applicants for space in this class residing east of Cleveland, Ohio, were summoned to a meeting held in the Equitable Building, New York City, where the policy of the department with reference to space allotments was foreshadowed. To the assembled representatives was explained the lack of space in the Champ de Mars, and the three alternatives already referred to. Your director proposed to assume, for the exhibitors entering into the project, the responsibility of designing, constructing, and maintaining the building and necessary power plant, providing they would pay the cost thereof, which was to be predetermined before their acceptance. An estimate of \$1.25 per square foot of floor space was given them as covering the entire cost of the building, and \$5 per month per horsepower for the motive power required. Each exhibitor accepting space at Vincennes was to be given sufficient space on the ground floor in the Champ de Mars for headquarters, and perhaps one or more sample machines, giving him the opportunity of there meeting foreign customers and visitors, but the main operating exhibit was to be made at Vincennes, where machines were to be shown in actual working condition. An informal vote was taken with the understanding that each firm represented should, within ten days, send the director a written confirmation or rejection of the plan. The voice of the meeting was unanimous in favor of the project. It may be of interest to state that although but two days' notice was given of the meeting, and the firms represented were scattered over an area having a radius of over 600 miles, there were 42 delegates present, which indicated the feeling of the machinery interests in the question.

The success of this meeting caused a similar call to be sent to applicants west of Cleveland to meet in Chicago a week later, where the same details were presented, and the same informal and unanimous concurrence was received from the delegates present. At each meeting there was some discussion as to the wisdom of installing a machinery exhibit at Vincennes, yet the consensus of opinion was that as an alternative it was preferable to accept this situation, which would enable all to exhibit, rather than to abandon or discourage the idea and make it necessary for the Commissioner-General to reject all but a few representative firms in organizing the machine-tool exhibit for the United States.

SIZE AND STYLE OF MACHINERY BUILDING.

The dimensions of the building proposed were limited to the ground area granted by the French administration, 80 by 250 feet. The pre-

liminary plans contemplated a building of steel and of modern machine shop construction with three bays. Galleries in the side bays were to provide an additional amount of space for exhibit purposes. The first plans of the building were drawn on these lines, but the idea of galleries was subsequently abandoned on account of the extra ground space conceded from time to time by the administration, which allowed sufficient room for all exhibits on the ground floor.

COST OF CONSTRUCTION OF BUILDING.

Before a definite arrangement with intending exhibitors could be undertaken, a thorough study of conditions had to be made and estimates obtained from reliable sources for the purpose of arriving at the cost per square foot of the building erected and ready to receive exhibits. Many difficulties were encountered in securing bids from contractors willing to make an agreement which covered so many unknown conditions in Paris. After much correspondence and fruitless effort which were most discouraging, an accidental inquiry brought out the name of the Berlin Iron Bridge Company, of East Berlin, Conn., as a builder of steel structures in foreign countries. Negotiations were immediately begun, with the result that this company agreed to undertake the fabrication and erection of the steel framework, provided a manufacturer could be found who would furnish the raw material. The very liberal offer and price made by this company brought the total estimate within the sum originally calculated by your director as presented to the exhibitors' delegates, and made possible the preparation of the circular letter dated May 24, 1899, which was sent to exhibitors interested in the project.

Your director believed he was justified in proceeding with the building project with all possible haste, after the Chicago meeting above referred to, especially as many of the largest concerns telegraphed a confirmation of the vote of their delegates.

DIFFICULTIES—RISE IN PRICE OF STRUCTURAL STEEL.

During the latter part of June and the early part of July a marked advance in the price of structural steel and the extraordinary demands for this class of material endangered the building project, as no steel manufacturers could be found willing to make an offer covering the supply of the raw material within six months, and even then the price would be far beyond the ability of the department to pay. Numerous methods to secure a satisfactory building at a practical price proved fruitless, and the bids submitted proved too high on account of the rapid advance in the price of building materials of all kinds. Efforts by cable were made to secure in Paris a favorable price, but with no avail, and for a short time the fate of the project was extremely doubtful.

STEEL SECURED.

About the middle of July, 1899, a strong appeal was made to the president of the Carnegie Steel Company, with the result that this company agreed to supply all the raw material for the steel structure at a price slightly above actual cost. This generous and patriotic action made possible the continuation of the project. The Berlin Iron Bridge Company was immediately instructed to prepare designs for the framework, a draftsman from this department being sent to the company's works for the purpose of aiding in the preparation of the plans.

OUTSIDE COVERING FOR BUILDING.

The steel framework of the building thus having been definitely contracted for it became necessary to provide for the exterior covering, which could better be undertaken by contractors in Paris than to have the material and workmen sent from the United States for that purpose. On July 26 the director sailed from New York to Paris, where plans and specifications for the exterior were prepared by our draftsmen to conform to French practice in staff and carpenter work. Bids were asked for from several contractors of good repute. The lowest reliable bid was received from A. Saint-Beuve, who had previously received the contract for the agricultural annex and publishers' building.

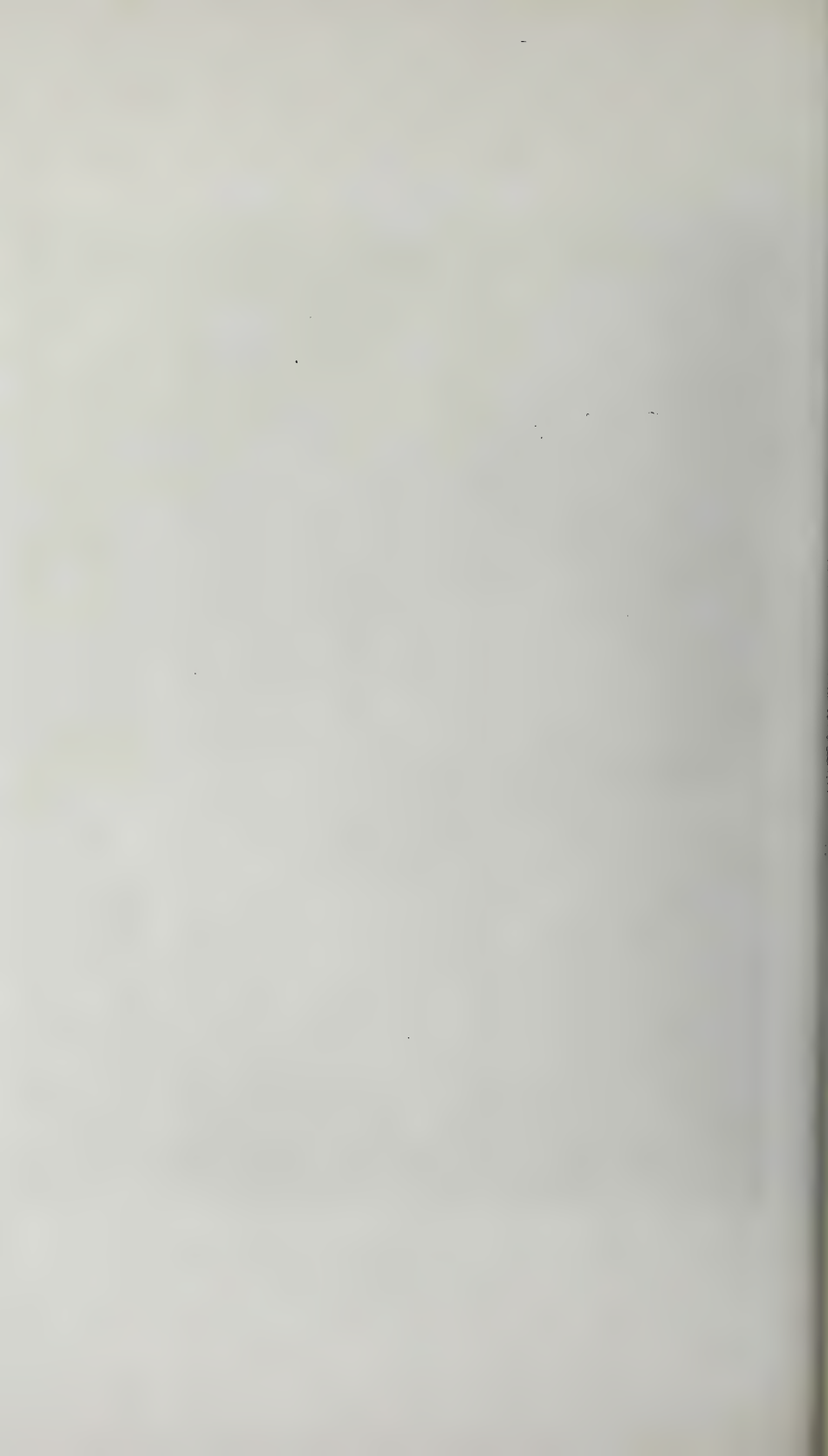
The difficulty in securing French architects competent to carry out the economical erection of a special building designed for special mechanical exhibits caused your director to rely solely upon the engineering plans for the steel framework as prepared by the Berlin Iron Bridge Company, with the collaboration of Mr. J. A. Gurd, chief draftsman in the Paris offices, who prepared under instruction the detail drawings for the staff and wood work. The results were eminently satisfactory, not only as regards the cost but the rapidity with which the work proceeded during the construction period. The expense of this building having been provided for by a special agreement with the proposed exhibitors therein, the contract with the successful bidder was approved and executed by your director as the representative of those contributing to the fund. By the middle of September these formalities were fully completed, the latest being decided by cable from Chicago after your director's return.

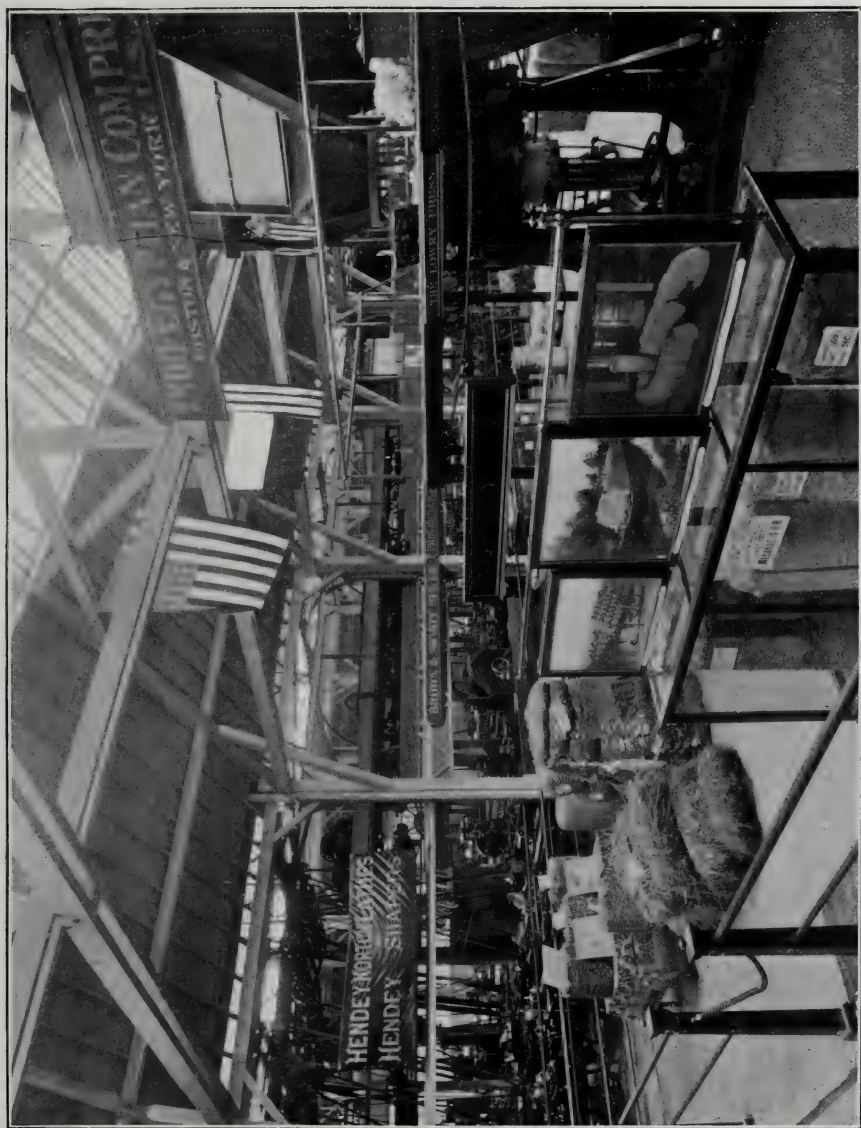
PROGRESS OF BUILDING.

In the meantime the Carnegie Steel Company had, on August 28, begun shipment of the structural steel to East Berlin. Less than one hundred days from this date the entire framework was completed and on board of the United States transport *Prairie* en route to Paris.

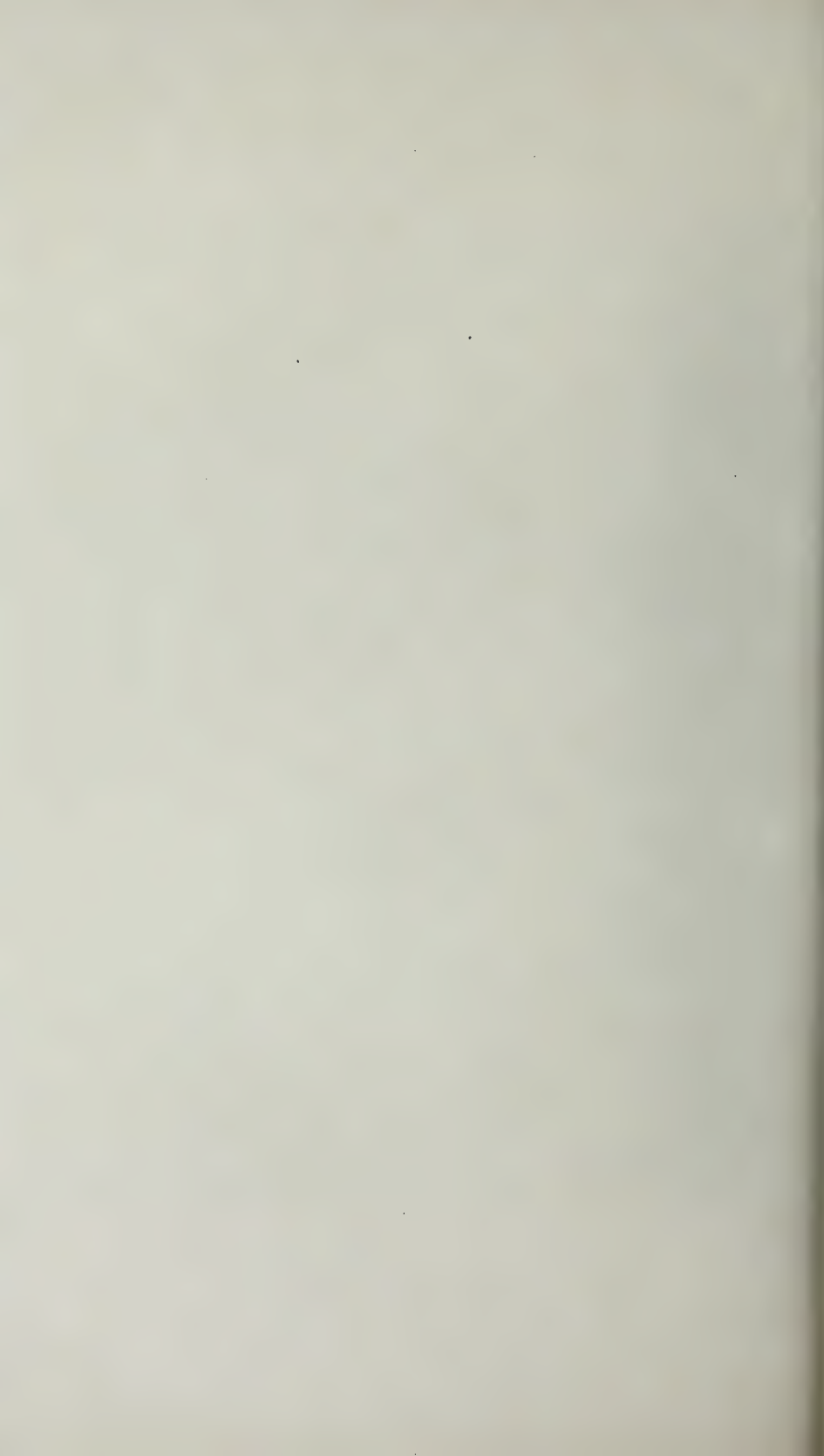


D-3. INTERIOR MACHINERY ANNEX, BOIS DE VINCENNES, SHOWING GENERAL STYLE OF INSTALLATION AND TRAVELING CRANE.





D-5. SECTION OF GENERAL MACHINE-TOOL EXHIBITION, BOIS DE VINCENNES.



The interest taken by these two firms in the prompt execution of this work was most commendable and decidedly encouraging to the department as well as to the exhibitors.

POWER PLANT FOR MACHINERY BUILDING.

The building having been arranged for, the question of the power plant necessary for the operation of the machinery to be exhibited in it became an engrossing subject. The contribution from the proposed exhibitors of \$1.25 per square foot covered only the cost of the building without power plant, railings, steam or water piping, electric wiring, or traveling crane.

In order to arrive at an estimate of the total power necessary urgent requests were made of the exhibitors to furnish the department with information as to their requirements. About the middle of September a sufficient number of these reports had been received to indicate a maximum load of from 250 to 300 horsepower.

Owing to the arrangement of the space allotments to secure the greatest area for the various exhibits, it became evident that any general plan of line shafting for power distribution would be impracticable. The location of the various machines with reference to the axis of the main bay would make uniform driving by belt from countershafting practically out of the question. It was therefore determined that all motive power supplied to exhibitors for the operation of their machines should be in the nature of electrical current delivered from general mains passing through or near their spaces, each exhibitor to provide his own motor and any necessary countershafts. This information was promulgated promptly by circular letter so as to permit the necessary arrangements for each exhibit in conformity with a general scheme.

To Mr. Charles T. Malcolmson, who had been appointed, in July, electrical and mechanical draftsman for the department, was confided the preparation of the general specifications for the generating and distributing plant. In order to provide against accident a boiler capacity for twice the power requirements was decided upon and letters were sent to several prominent manufacturers inviting them to contribute or loan two 250-horsepower water tube boilers for this building. The only applicant of record for space for the exhibit of boilers was the Clonbrock Steam Boiler Company, of Brooklyn, N. Y. Your director was unable to secure satisfactory terms from any of the makers, and a settlement of the boiler question dragged along for some time. The prejudice of European manufacturers and buyers against the American type of boilers, and, as before related, the excessive cost of transportation, duties, etc., prevented our builders from entering into this project with any activity, as no commercial results or profit could be shown.

Coincident with the negotiations for the boilers, attempt was made also to secure a necessary steam engine, electrical generators, and the various other accessories of the power plant. Urgent letters were sent to several manufacturers in each line, which, however, elicited practically no response. In fact, the same objection was made on the part of those manufacturers to exhibit in Paris as was offered in connection with the boilers. Each of these necessary adjuncts had to be arranged for finally by special contract.

A traveling crane, which should have ample capacity to handle any of the machinery or parts composing the exhibits intended for this building, was also a prime requisite. A 30-ton, three-motor electric traveling crane of modern design and construction was finally tendered for the use of the department by Manning, Maxwell & Moore, exclusive selling agents for the Shaw Electric Crane Company, of Muskegon, Mich. The crane, with the appurtenances and spare parts, was to be delivered by them f. o. b. at the port of New York, the department to pay all transportation and other expenses in connection therewith, and either return the same to New York after the close of the Exposition or make such other disposition as they might authorize. This crane was promptly shipped and transported by the United States transport *Prairie* on her first trip.

The allotment of space to the manufacturers of pneumatic tools, and the necessity of providing compressed air for their operation, made it necessary to furnish, either as exhibits or as accessories to the power plant, suitable air compressors.

ENLARGEMENT OF VINCENNES EXHIBIT.

This latter question, when discussed with the director in chief, brought about the enlargement of the scope of the proposed exhibit at Vincennes in the United States machinery building, so that it would not only cover the machine-tool interests, comprising all machinery for working in metal and wood, but also extend to mining and power transmission machinery, for which no space whatever was available in the Champ de Mars. The department of mines and metallurgy had up to this time been compelled to refuse all applications for space for the installation of mining machinery. By mutual agreement of the directors interested, and with the consent of the Commissioner-General, it was proposed to enlarge the machinery building sufficiently to accommodate the principal mining-machinery exhibits, among which would be found the necessary air compressors for operating the pneumatic tools already referred to. The exhibitors of mining machinery, classified under Group XI, were willing to accept the same conditions imposed upon the exhibitors of the department proper, and in every way, except in the presentation to the international jury, be considered within the jurisdiction of the department of machinery and electricity.

The director of agriculture, having experienced difficulty in caring for large and important exhibits in cotton-baling machinery, was also accorded the privilege of selecting from among his applicants certain exhibitors, who were to be cared for in this building under similar conditions.

BUILDING ENLARGED.

These accessories were valuable viewed from any standpoint. They not only contributed to a larger scope for the exhibits from the United States, but also added interest and attractiveness to the special line of machinery first proposed for this building. However, the original plans on which the contract had been awarded were insufficient to accommodate these new exhibits and it became necessary to enlarge the building, not only in the proposed addition to the south of the main structure, but also by removing some of the power-plant machinery from the building proper to an enlarged power addition. Arrangements were made by cable with the department's representative and the contractor in Paris to provide for this increase.

LARGE TRIANGULAR TRACT CONCEDED UNITED STATES AT VINCENNES.

Owing to the importance of the proposed machinery building at Vincennes (which was known throughout the Exposition as the United States machinery building) and the other industrial exhibits which it was possible to consolidate with the main attraction, the French authorities deemed it desirable to set aside a considerable tract which should be devoted to exhibits from the United States. The triangle bounded by the Route de la Plaine, Route du Bac, and Route des Glacieres was definitely assigned to the United States. The importance of the work contemplated by this department at Vincennes caused you, upon the recommendation of the director in chief, to place the director of this department in full charge of the individual exhibits which might be assigned to this triangle. The location of the spaces and the general arrangement of the following exhibits were duly undertaken and carried out by your director: The pavilions of the McCormick Harvester Company, American Bicycle Company, Smith & Wesson, and the Incubator Company, also the installation of wind-mills, and the mechanical application installed and operated by the Robins Conveying Belt Company, the Pittsburg Oil Well Supply Company, and the Chicago Pneumatic Tool Company.

POWER PLANT COMPLETE.

During the month of October, complete and definite arrangements were concluded for all the machinery and apparatus necessary for the power plant for the building. In the case of the boilers, engine, generator, and traveling crane, an understanding was had in writing with

the manufacturers to pay a certain fixed price sixty days after the close of the Exposition. A number of other accessories, such as feed-water heater, pump, injectors, etc., were loaned to the department without any requirements as to payment at the end of the Exposition.

The power plant included the following:

Two 250-horsepower boilers, Clonbrook Steam Boiler Company, Brooklyn, N. Y.
 One 300-horsepower compound engine, Ball Engine Company, Erie, Pa.
 One 211-kilowatt generator, Bullock Electric Manufacturing Company, Cincinnati, Ohio.

One 30-ton traveling crane, Shaw Electric Crane Company, Muskegon, Mich.

One feed-water heater, Taunton Locomotive Manufacturing Company, Taunton, Mass.

One feed-water pump, Geo. F. Blake Manufacturing Company, New York City.

Two injectors, Lee Injector Manufacturing Company, Detroit, Mich.

Pipe covering, H. W. Johns Manufacturing Company, New York City.

Valves and fittings, Crane Company, Chicago, Ill.

The greater part of this machinery was shipped on the *Prairie* on her first trip.

ELECTRICAL EXHIBIT.

Your director did not experience the same favorable progress in securing creditable and representative exhibits in the electrical groups.

Among the documents transferred by the office of the late Special Commissioner Moses P. Handy, there were written applications from electric manufacturing companies for space amounting in the aggregate to more than 150,000 square feet. Scarcely any of these applications were renewed when the question of actual participation came before the proposing companies for definite action. Invariably the excuse given by electrical companies was that they were too busy with present orders, besides citing the difficulty in selling their special products in Europe, owing to the disadvantages labored under by reason of freights and duties. The previous sale abroad by many establishments of licenses to build their machinery in the various European countries, and the existence of a combination of the largest electrical manufacturing companies, or at least of a financial arrangement concluded to prevent dangerous competition, further narrowed the possibilities of securing the full participation desired by your director. Only two of the great electrical manufacturing companies would give assurance of making creditable exhibits, and asked that suitable space be held at their disposal, viz, the General Electric Company and the Westinghouse Electric and Manufacturing Company. Both of these companies were represented at the Exposition; the former having furnished designs for the largest dynamo in the French power section, while the latter furnished all the generating apparatus and substation devices for operating the moving platform, which was one of the mechanical and electrical successes of the Exposition, and for which a grand prize was awarded.

COLLECTIVE ELECTRICAL EXHIBIT.

It required great persistence to procure satisfactory electrical exhibits on general lines. The General Electric Company could not be induced to participate by a commercial exhibit from its works in the United States, but confined itself in this connection to an elaborate model of its Schenectady shops, with an assortment of photographs illustrating large power-transmission plants and general installations. An intending exhibit of the Westinghouse Electric and Manufacturing Company for the Champ de Mars section was withdrawn on account of press of orders at home. Indeed, the many special applications of electricity would have failed entirely in representation in Paris had it not been for your decision to permit the departments to organize and install "collective exhibits."

The failure to secure the cooperation of the leading electrical manufacturers to make individual exhibits, placing their own competent representatives in charge, instigated this opportune plan of providing, in the gallery space in the Champ de Mars, a collective exhibit of the various small, though not unimportant, electrical and mechanical specialties. Together with the material for this exhibit, the firms represented were to contribute a sum sufficient to provide proper display cases and to pay the expense of the necessary attendants, janitors, etc.

The space set aside for this collective exhibit was approximately 80 feet long by 20 feet wide. On it was to be installed 16 show cases of uniform design, constructed to afford a proper display of the various exhibits. The wall space for the entire length of the collective exhibit was also to be devoted to panels upon which were to be mounted various types of electrical and mechanical products.

This and other information was transmitted to all the reputable companies and firms, and many personal calls were made for the purpose of explaining in detail the proposed exhibit and the desire of the department to have all the specialties as well as the general electrical industries represented. Mr. Warren E. Weinsheimer was selected as the superintendent in charge of this loan and collective exhibit, being appointed with approval of the exhibitors.

The work of procuring items for this collection proceeded slowly, though satisfactorily. The plan adopted required the handling of moneys, which service was intrusted by this as by other departments to Mr. C. I. Drake, who had previously been appointed trustee for the funds collected for the purpose of erecting the United States machinery building at Vincennes.

The numerous changes in the arrangement of space allotments, caused by withdrawals on the one hand and accessions on the other, continued throughout the winter months and, in fact, until the opening of the Exposition. By the end of December, 1899, the work of the department was in such a satisfactory condition, not only as

related to the space allotted to exhibits under preparation, funds collected, etc., but also as to the personnel necessary for preparing and conducting in Paris the installation and mounting of exhibits, that your director was instructed to proceed to Paris—sailing January 4, 1900—for the purpose of pushing the construction of the United States machinery building at Vincennes and arranging the multitudinous details of this more or less technical department. You also empowered your director to act as chief of the exhibit staff in Paris until the arrival of the director in chief of exhibit departments, thus committing to his attention all matters relating to the transportation, care and installation of exhibits of all departments. These extra duties required close application to the requirements of the various departments, and were continued until early in March, when the full staff was due on the Exposition grounds.

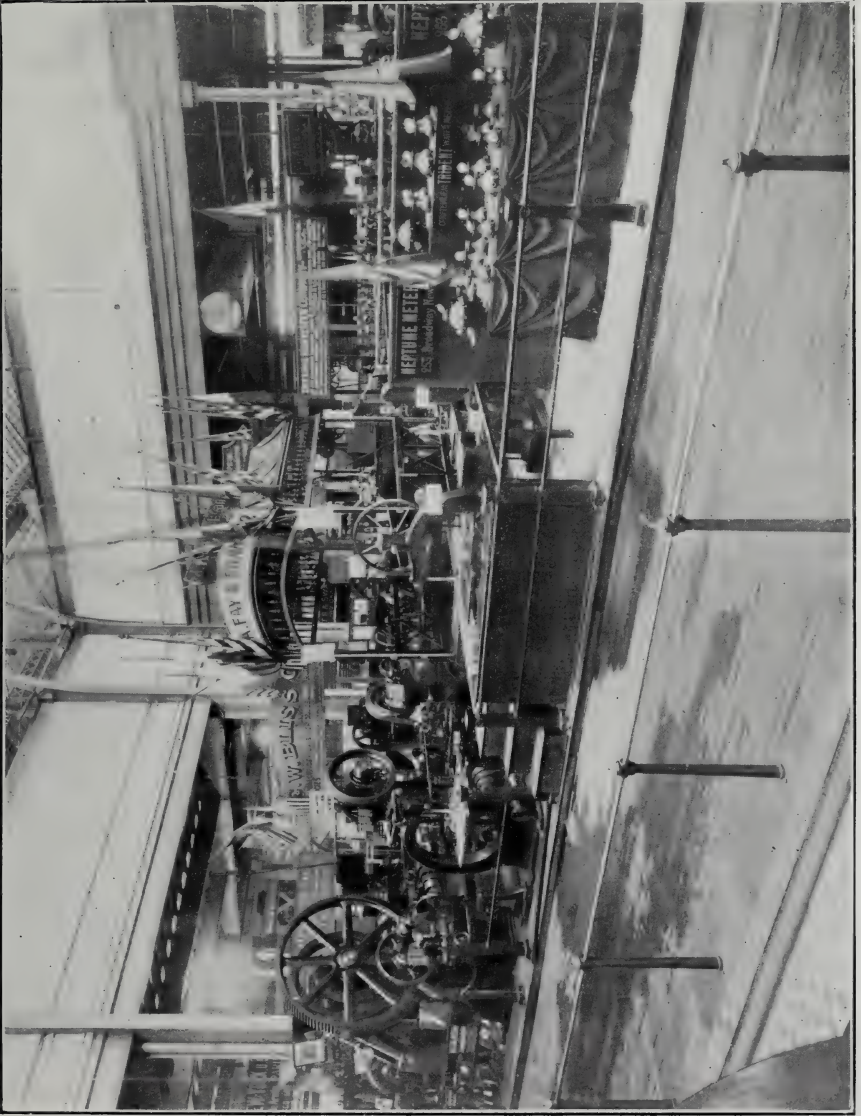
ERECTION OF MACHINERY BUILDING.

When the director arrived in Paris, January 10, 1900, the excavations for the foundation of the United States machinery building had just been completed. The very inclement weather of December and early January had prevented any active work, as it was feared that frost would injure any foundation which might be attempted until a more favorable period. The structural steel had been ordered forward from Havre, and the erecting gang of the Berlin Iron Bridge Company was already on the ground. The men were somewhat delayed, owing to the weather, although the work was crowded to the utmost. The contractors were urged to begin the foundation at once, and except in the case of a few piers there was no further injury from frost or cold.

Great difficulty was experienced in getting the structural material to the site of the building. Contrary to all assurances of the Exposition authorities the railroad tracks into the Vincennes annex had not been completed, and in spite of all demands no satisfactory promise could be procured from them. This no doubt was owing to local conditions rendering track laying a slow and tedious work. After examining the various terminal stations in the eastern part of Paris it was decided that cars containing building material should be consigned to the station at Reuilly, and a contract was made with the Railroad of the East to cart all this material from this station to the building site for a sum of 10 francs per ton, which was the terminal switching charge settled upon by the authorities. The roads were in very bad condition and the work of hauling the steel proceeded very slowly, several of the drays requiring not less than eight or nine horses in order to draw an ordinary load through to destination. As fast as the material arrived on the spot the iron workers distributed it in preparation of the work of erection, and on the 29th day of January, 1900, the first section of



D-6. SECTION OF GENERAL MACHINERY INSTALLATION; DEPARTMENT OF MACHINERY AND ELECTRICITY, CHAMP DE MARS.



D-8. VIEW OF GENERAL INSTALLATION OF MACHINERY AND MACHINE TOOLS, CHAMP DE MARS.

the structure was hoisted. The entire steel work was in position and braced on February 9, 1900, a performance which reflects great credit not only upon the workmen in charge but on the company controlling them.

Upon the completion of the steel work the building was turned over to the contractor for the exterior, who was to have the structure completed and in readiness for exhibits on or about the 1st day of April. The tremendous demands for skilled labor created by the erection of so many Exposition buildings caused the contractor much uneasiness and the work many delays.

INSTALLING POWER PLANT.

Without waiting for the completion of the exterior, the setting up of the boilers and the preparation for steam piping, conduits, etc., was pushed with all possible speed. The discouragements suffered by your entire staff over delays in procuring the necessary fixtures were especially accentuated in this department by the necessity of buying in the local market such varied fittings as were required in the steam and mechanical installations.

LEADING EXHIBITORS WITHDRAW AT THE LAST MOMENT.

At the moment when the building was practically under roof a cablegram was received announcing that three of the largest exhibitors reserving space in it had suddenly determined not to participate in the Exposition. The reasons assigned were various. For the principal firm, which was engaged in the manufacture of mining machinery, the South African war furnished a very plausible excuse. This complication at a period within sixty days of the opening of the Exposition was a serious one for your director. The amount of space involved was nearly 5,000 square feet, which, if not disposed of, would cripple the building fund, besides leaving a very large section of the building unoccupied. By a hurried trip to London and the opening up of numerous negotiations by cable your director was enabled to record applications for a space covering 90 per cent of the relinquished area, and while his disposition did not in every case net the department the full price per square foot, it at least enabled a creditable closing of a wide gap and the practical solution of a very trying problem. Later on the remainder of the abandoned space was satisfactorily disposed of.

CONFUSION IN CHAMP DE MARS SPACE.

In the Champ de Mars the most discouraging outlook presented itself to the department at this time. On the 8th day of March the ground-floor space was a veritable mud hole, with no roof over the

section and much of the steel work of the palace remaining to be completed. Upon the urgent request of the authorities the department accepted, on March 8, 1900, the Salon d'Honneur space, which had neither floor nor roof, and the gallery space was in practically the same condition. With a large quantity of heavy machinery arriving daily destined for these places, the inability of the department to begin any operations looking toward the preparation of the space for occupancy made all concerned take a gloomy view of the situation. Repeated protests produced practically no effect, although no effort was spared to better the situation. The exhibitors on the ground were complaining, with ample justification.

On the 11th day of March the floor was begun in the Salon d'Honneur, and immediately thereafter the contractor for a façade or colonnade designed for this section began his work. Although the roof over the place had not been completed, it was progressing as fast as could be expected, considering the general condition of the building.

FAÇADE OF SALON D'HONNEUR.

The façade here referred to deserves some mention from the department in addition to what may be said concerning it by the chief of decorations. When your director devised and elaborated the plan for the historical and retrospective exhibit, hereinafter more fully described in the assistant director's report, a fitting scheme for the decoration and housing of these exhibits developed as an important factor. If an exhibit of these examples of inventive genius were installed with uninteresting surroundings or with a plan of installation little, if any, above mediocre, the effect which your director desired to produce would be in a great degree lacking. This section was, in effect, a museum, and contained so many objects of such special interest that the exhibit in its entirety called for individuality. The chief of decorations, after many consultations, procured and submitted designs for a façade or colonnade, which, it was thought, would answer this purpose. The result, however, was not all that was desired, and some difficulty was experienced in conveying to the decorators the idea that the exhibits which were to be housed would admit of classic treatment, although the pure classic would be too severe to produce a proper effect. A successful compromise was finally accepted and approved, and the colonnade as executed was entirely in harmony with the ideas of your director, and met with his full approval.

SERIOUS DELAY AND EXPENSE CAUSED BY LOSS OF OCEAN STEAMER.

The loss of the steamship *Paulliac*, belonging to the Compagnie Generale Transatlantique, caused great inconvenience to many of the departments, and particularly to your director of machinery and

electricity, as the generator for furnishing the power for the United States machinery building, together with the crank shaft of the Ball engine, the entire commercial exhibit of the F. E. Reed Company, and that of the McGraw Publishing Company, had been shipped in that ill-fated vessel. The importance to the department of the dynamo and engine shaft can scarcely be understood until it is called to mind that all the machinery in this building was to be propelled by electric motors supplied with power from this generator. The Ball engine—which had been received—would have been available for driving a dynamo by means of a belt, but the crank shaft had been forwarded with the dynamo. When it became apparent that all hope for the arrival of the vessel must be abandoned, your director cabled to the Bullock Electric Manufacturing Company and the Ball Engine Company to duplicate the orders with the greatest possible speed. The former company made a superb record in the construction, complete, of a duplicate generator from the rough castings to the finished machine in twenty-six days.

The department meantime was under the necessity of supplying electricity sufficient to operate the electric crane for the unloading of large and cumbersome exhibits, which were arriving daily. A make-shift arrangement was devised by using the hoisting engine which had been utilized in the erection of the steel framework, so that for a week or ten days the unloading was carried on with some inconvenience but with practical success. Urgent inquiry in every direction failed to discover a satisfactory steam engine and electric generator which could be procured and installed for service until the duplicate machine should arrive. It was not until a final appeal was made to the Westinghouse shops at Havre that the department was able to lease for a limited term a direct connected engine and dynamo which was forwarded and installed at large expense, but in time to aid exhibitors in their work of installation. Much credit is due to the personal efforts of Mr. Morris Coster, honorary consulting engineer to the Commissioner-General, for the procuring of this equipment. The great distress, delay, and expense which would have resulted had this unit not been procured can be readily imagined.

CHAMP DE MARS SECTION NOT COMPLETE AT OPENING OF EXPOSITION.

Meanwhile in the ground-floor section in the Champ de Mars the work had been rushed with all possible speed. The prospect was not altogether satisfactory, either to your director or to the exhibitors, but was the best that could be expected, owing to the delay in the completion of the palace. The roof of the building was not finished and made water-tight until the end of March. The department notified the authorities concerned that it would install a floor without waiting for the official contractor, as by so doing it was believed that at least

ten days' time could be gained. The insufficient arrangement for delivering cars containing exhibits to the exposition space and the absolute lack of unloading facilities congested the work so that confusion reigned supreme; but in spite of this chaotic condition exhibitors were active and even aggressive in their work of installation. The section was far from being in readiness, however, as the day for opening the Exposition approached.

RETROSPECTIVE EXHIBIT PARTIALLY INSTALLED.

In accordance with the plan of the committee of ceremonies for the opening day, the President of the Republic was to pass directly from the Salle des Fêtes through the palace of electricity along that portion of the Salon d'Honneur which had been assigned to the United States. In view of this arrangement the department was urged to devote special effort to the preparation and installation of the retrospective exhibit and the colonnade inclosing it. Notwithstanding the great delay in the completion of the palace itself and in the beginning of the work of construction, the colonnade, or façade, was practically completed on the 14th day of April and several of the important cases and installations of the retrospective exhibit were in place, so that a creditable showing was made.

On the last Sunday of April, during a heavy thunder storm the whole Salon d'Honneur was inundated. Considerable damage was done to the cases, to the colonnade, and to some of the exhibits. Much of the staff work was damaged also, as well as the painting and the electrical installation. This flooding of the space delayed the completion of the exhibit and greatly increased the cost of the entire undertaking. It became necessary to stop all work until satisfactory repairs had been made in the roof.

Many of the exhibits intended for the ground floor space in the Champ de Mars had been delayed at American ports on account of the difficulty of securing shipping space in vessels, but in the majority of cases the delay occurred between Havre and Paris, owing to the lack of cars and failure to provide switching facilities at the terminals. Further delay was met in arranging for the installation of certain exhibits in this section. It was discovered that proper condensing apparatus had not been provided for the space by the authorities. In order to operate the pneumatic tool, liquid air, and other exhibits, two steam air compressors were necessary to provide air power. On account of the lateness of the installation and the fact that two individual exhibitors were to be served by one set of mains, the department decided to install the necessary apparatus, piping, etc., for the condensers for these two machines and charge the expense to the two companies interested. The task was not an easy one, as the proper

fittings, elbows, flanges, etc., for this class of work were difficult to obtain in Paris, and, owing to the lack of data beforehand, the material had not been ordered from the United States.

All of these conditions contributed to the lateness of the complete installation, even after the floor was laid and everything was in readiness for the goods.

OPENING OF MACHINERY BUILDING.

On April 14, at 8 p. m., you were furnished a report concerning the United States machinery building at Vincennes, showing that the power plant for the building, comprising two 250-horsepower boilers, a temporary engine and dynamo, the two air compressors of the Ingersoll-Sergeant Drill Company, and the electric traveling crane had all been placed in operation. This was the only portion of the entire Exposition to be operated on the opening day by exhibition boilers. All the traveling cranes and their accessories and other operating machinery in the Champ de Mars were operated by power received from outside of the Exposition grounds. In view of the general tardiness of the entire Exposition, the achievement at Vincennes was considered a considerable triumph for the enterprise and energy of the exhibitors and others in the department.

The more belated exhibits for this section of the department's display having been received and installed, and the finishing touches given to the building and its power plant early in the month of May, the formal official opening and dedication of the United States machinery building was effected on the 15th day of May, on which date the building was declared by you open to the public, in the presence of the ambassador of the United States, the officials of the French administration, many members of the Commission, and a large number of invited guests. Considerable public interest attached to these ceremonies, and this feeling was fostered by all the members of your staff, for the purpose of adding publicity to the Vincennes annex. Sousa's band added brilliancy and pleasure to the occasion.

CHAMP DE MARS EXHIBITS EXPOSED.

All three sections under the jurisdiction of the department in the Champ de Mars were officially declared completed and open to the public on the 10th day of June, although they actually had been completed some days previously. It was not until some time after this date that the German, English, and French sections in this department of the Exposition were entirely completed. On the date mentioned the simple ceremonies of a formal opening were held in the Salon d'Honneur, after which the other two sections were visited for the purpose of inspecting the moving machinery.

PLANS OF EXHIBIT SPACES.

Accompanying this report are the official floor-plan drawings of the United States machinery building and the three Champ de Mars spaces of the United States department of machinery and electricity—ground floor, Salon d'Honneur, and gallery space, respectively. A number of photographs illustrating the exhibits and general installation, with proper designations, are also herewith transmitted.

LIGHTING UNITED STATES PAVILION AND EXHIBIT SECTIONS.

In the latter part of December, 1899, the department undertook a special task, viz, the installation of electric lights and power in the United States National Pavilion and in all the United States exhibit sections where light and power are required. In connection with such installation your director undertook the purchase of the materials necessary, upon the orders of the various directors. These supplies were purchased in nearly all cases at a cost ranging from 25 to 50 per cent below the market price. Upon personal solicitation the American Steel and Wire Company consented to donate, free of all charge, over 20,000 feet of insulated wire of various sizes for the use of the Commission. As it became necessary to take up in Paris the active work of the electric wiring, etc., a number of wiremen and electrical workmen were engaged in the United States at salaries ranging from \$40 to \$60 per month. These men were mostly graduates of technical schools who had received practical experience after graduating, and who were possessed of a strong desire to see the Exposition and gain such experience as might be possible from the visit and environment. In this manner the department was able to secure an excellent class of men at very low wages.

The first contingent of these electricians sailed from New York January 12, 1900, the men being immediately put to work upon their arrival in Paris, under the direction of Mr. William D. Ball, who had been appointed on December 7, 1899, engineer of construction for the department. The number of wiremen was augmented from time to time as the work increased. The total number of different men employed was 29, but this number was not employed at any one time. As the work was finished many of the men returned to the United States; others found employment with exhibitors, in the guard service, or as permanent attendants in charge of the various electrical installations of the Commission.

MEMBERS OF STAFF RESIGN TO ACT AS JURORS.

Under instructions, your director and four other members of the departmental staff resigned their positions on May 31, in order to serve as members of the international jury of awards; Mr. James S.

Anthony, assistant director, being designated as juror in class 26; Mr. W. D. Ball, engineer of construction, class 23; Mr. Charles T. Malcolmson, alternate in class 23, and your director in class 22. Owing to the importance of the exhibits from the United States in class 22, your director was elected vice-president of the class jury. While serving in this capacity the work of the department was supervised by the director, although Mr. Walter R. Talbot, chief clerk of the department, was appointed acting director of machinery and electricity during the existence of the international jury. On August 15, the engineer of construction and juror in class 23 resigned and returned to the United States, Mr. Charles T. Malcolmson being appointed to succeed him. On this date your director and assistant director were reappointed to their former positions on your staff.

AWARDS SECURED BY EXHIBIT OF DEPARTMENT.

Although the details of the work of the jurors and the awards in the various classes comprising the department will be found elsewhere, it may not be out of place here to mention the general results of the entire department as far as awards are concerned:

Group IV, machinery:

Grands prix	10
Gold medals	24
Silver medals	45
Bronze medals	49
Honorable mention	29

Group V, electricity:

Grands prix	6
Gold medals	15
Silver medals	16
Bronze medals	40
Honorable mention	20

Total	254
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SPECIAL JURY APPOINTMENTS.

In addition to the appointment of the jury of several members of the departmental staff, your director had urged the naming of several experts who had followed closely the work of the department and were in sympathy with its aims. Charles Le Blanc, Prof. Storm Bull, Hart O. Berg, George R. Ostheimer, Carl Hering, and R. C. Lewis were recommended as your official representatives in classes 19, 21, 22, 24, 25, and 27, respectively. To the hearty cooperation of these gentlemen, under the direction of your juror in chief, augmented by the work of the members appointed from the department and backed by the representative quality of the exhibit, the satisfactory and generous awards are due.

MACHINERY BUILDING AND POWER PLANT SOLD.

When the time for the closing of the Exposition approached, it seemed very important that the power-plant equipment in the United States machinery building, as well as the structure itself, with all appurtenances, should be disposed of to such advantage as would yield the greatest return and relieve the department and Commission from actual and implied obligations. Negotiations had been in progress for some months with different correspondents for the sale of the building. The extreme customs duties required by the French Government upon the building and machinery if left within the confines of France would be practically prohibitive. Your director was forced to seek a market for the machinery and building in other countries, notably in England and Germany. Serious inquiry was made for the building from Charleston, S. C., where an exposition of considerable size was contemplated. Your agreement with the Exposition authorities required the removal of the building and machinery and all the débris from the Park of Vincennes within six months from the close of the Exposition. After much correspondence, and with the assistance of Charles Neat & Co., of London, England, the building and its entire power-plant equipments, traveling crane, and all accessories not owned or controlled by exhibitors, was sold to the Mather & Platt Company, Limited, of Manchester, England; this company contracting to dismantle and remove everything from the park and place the grounds in their original condition on or before June 1, 1901. The sum agreed upon for the building and apparatus was promptly paid by the purchaser to the trustee. This fund made possible the discharge of all obligations concerning the building, with the exception of a bill for coal during the Exposition period and several other items amounting in the aggregate to approximately \$10,000, which sum had been set apart by you upon the recommendation of your director for the liquidation of a deficit that had been apparent for several months. Had the price for the building been increased with the intent of covering this deficit or any portion thereof, the sale would not have been effected. The advantage of transferring to one firm the entire equipment and the building, with the obligations upon them to remove it from the Exposition grounds without further expense or trouble to the Commissioner-General and his staff, was more advantageous and undoubtedly more remunerative than if the building plant and accessories had been disposed of to separate bidders.

OPERATION OF MACHINERY BUILDING.

Briefly summarizing the plan of operating this building and procuring means for maintenance, it may be stated that nearly all of the exhibitors availed themselves of the service of the traveling crane for unloading, placing, dismantling, and reloading their exhibits, paying

therefor a sum represented by the actual labor and material provided and expense assumed by the department in connection with these functions. Each exhibitor was permitted considerable latitude in all such arrangements, as is evidenced by the various circular letters of the department, copies of which are in your files. It is the desire of your director to compliment to the fullest degree the promptness and general obedience of the exhibitors to the requests and regulations of the department concerning the operation and maintenance of the building, and to the liquidation within the prescribed period of all obligations in full. While the full financial statement of the trustee for the collective exhibit will be submitted to you by that official, it is proper for me in this connection to state that the exhibitors who had accepted space in the United States machinery building promptly remitted the assessments which were levied from time to time to carry on the necessary work of the enterprise. The first call of the trustee was for 50 cents per square foot out of a total of \$1.25. This was followed within sixty days by a second call for a similar amount, the third and last call being made just before the close of the year, thus enabling the trustee to make final collections before transferring his office to Paris.

SPECIAL SERVICE RENDERED BY POWER PLANT.

The record of the building and its power plant would not be complete unless mention was made of the fact that from this power plant was operated many of the other working exhibits in the annex of Vincennes. Compressed air was piped by it a distance of 1,500 feet to the American locomotive air-brake exhibit and the pneumatic signals shown in the United States section of the transportation building. It supplied all the motive force for drilling the artesian well 2,000 feet deep, executed by the Pittsburg Oil Well Supply Company as a practical demonstrator of their oil-well drilling. In addition, the power for the machinery in the McCormick pavilion for the operation of the conveying apparatus of the Robins Conveying Belt Company and for the electric lighting of the Smith & Wesson pavilion, as well as of the handsome passenger train of the London and Northwestern Railway Company of England, was furnished from this plant.

DISMANTLING BUILDING.

In view of the sale of the building, and the important work of hastening and dismantling and shipping of the exhibits, Mr. Charles T. Malcolmson, who had recently been appointed chief mechanical and electrical engineer of the department, was placed in entire charge of the structure in October. Conference with the principal exhibitors was had with reference to the early removal of their exhibits, and

every needed protection was taken to insure the greatest possible speed. The extension by the French Government of the closing day of the Exposition to November 12, 1900, seriously inconvenienced us, although under directions from you the exhibitors were permitted to begin the work of demolition at 6 o'clock on the evening of the 5th of November. Electric-lighting fixtures had been installed throughout the building, making work possible during the dark hours until late in the evening. Excellent progress was made in the work of dismantling during the succeeding three weeks.

DISCHARGE OF ALL OBLIGATIONS OF THE DEPARTMENT.

All the important work having been well provided for, and Mr. Anthony being appointed to fulfill the duties of acting director of machinery and electricity until his departure from Paris, your director left on November 30, 1900, for the United States, for the purpose of there discharging all obligations resting on the Commissioner-General and the department for materials and machinery supplied the United States machinery building, and such other duties as the nature of the work would impose upon him.

Upon the date of sailing, the resignation of your director was accepted by you, to take effect on the 1st of February, at which time it was believed that practically all the functions of the department would be discharged.

PACKING AND RETURN OF EXHIBITS.

The work of packing and preparing for shipment the historical and collective exhibits was well under way and completed before the 15th day of December, at which time the assistant director, together with other members of your staff, sailed for America. On this date Mr. Charles T. Malcolmson assumed the duties of acting director of the department, with instructions to remain in the service in Paris until January 15, or until otherwise directed by you.

CONCLUSION.

In referring in a general way to the work of the department and its relation to your mission, the director is firmly convinced, not only from his own observation, but from the private and public statements made by exhibitors, and the importance given the exhibit by interested visitors at Paris, that the most successful and commendable portion of our work was that comprised in the United States machinery building at Vincennes. By reference to the detailed descriptions and illustrations of the various exhibits, as compared with exhibits of a like character presented by other nations in other parts of the Exposition, it will be observed that the most modern and improved automatic and general man-



D-9. VIEW OF GENERAL INSTALLATION OF ELECTRICAL APPARATUS AND SUPPLIES, DEPARTMENT OF MACHINERY AND ELECTRICITY, CHAMP DE MARS, FIRST FLOOR.



D-10. VIEW IN ELECTRICAL INSTALLATION, DEPARTMENT OF MACHINERY AND ELECTRICITY, GROUND FLOOR, CHAMP DE MARS.

ufacturing machinery produced by American genius was on exhibition in this building, and in nearly every case shown in operation, illustrating the advantage to be gained from these types. Much publicity in European technical and industrial papers was given to the project, and the attendance, though small as compared with the Exposition proper, was made up of those who were engineers, buyers, or interested parties, who made a special effort to see and examine thoroughly the American machinery section. The project was one requiring great attention to detail and willingness to assume heavy financial obligations. Your director is proud of the showing made by these most progressive and representative manufacturers of our country, and congratulates them, as well as you, upon the success of the project. In round figures this building and its maintenance represented an expenditure of \$100,000, all of which, with the exception of the \$10,000 referred to in a foregoing page, was collected from the exhibitors and others interested.

A complete roster of the members of the department is hereto attached. Your director desires to express his sense of appreciation of the loyal, conscientious, and intelligent service rendered by each and every one of these assistants and collaborators.

Respectfully submitted.

FRANCIS E. DRAKE,
Director of Machinery and Electricity.

HON. FERDINAND W. PECK,
*Commissioner-General of the United States to the
Paris Exposition of 1900.*

S. Doc, 232, pt 3—10

DESCRIPTION OF EXHIBITS.

In presenting a brief description of the exhibits shown in the department of machinery and electricity of the United States (Groups IV and V) at the Exposition of 1900, no attempt has been made to describe standard or well-known articles in detail, while attention has been given to the altogether new or improved exhibits. There were many exhibits which, though admirably presented to the public, showed nothing of a remarkable or particularly interesting character, and in many cases mention of these has been omitted. The descriptions have been arranged alphabetically in classes for purpose of ready reference. Where exhibits of a single firm were of such a varied nature that they might extend into several classes, the most important features have been taken to determine the class of the whole.

The decorative features, which were so prominent in other exhibit sections of the United States and which added so much to their attractiveness, would have been out of place in the commercial sections of the department of machinery and electricity. Consequently, the department confined itself to an ornamental iron rail and lamp-posts, except in the retrospective exhibit, or Salon d'Honneur, which was completely surrounded by an elaborate façade in staff. Provision was made at considerable expense to light the Champ de Mars section at night, but after putting off the date for night openings until midsummer the French administration abandoned the idea entirely.

Out of the nine classes included in the two groups under this department, by far the most important in point of number of exhibits and space occupied was class 22—machine tools for working in metal and wood. Manufacturers of this class of machinery had every incentive to make an extensive showing, owing to the remarkably wide market which they have secured throughout Europe. It was only owing to the lack of space at the department's disposal that this class was not represented in each individual case by a larger exhibit.

When the project of exhibiting at Vincennes was accepted by the exhibitors in this class, it was determined by the department that each firm should be granted a space on the Champ de Mars, where one or two machines might be shown and where a representative might place his desk. This plan was carried out in nearly every case, so that in the descriptions it may be assumed that all exhibitors in class 22 had

two separate exhibits, except where the contrary is stated. In regard to the three other classes in Group IV, 19 to 21 inclusive, the representation in each case was excellent, but not as extensive as in class 22. In class 19—steam engines and accessories—the absence of any very large units in the United States sections caused some remark. The reasons for this absence have been given at length by the director of the department in his report. The showing of steam specialties was very complete and satisfactory.

The representation in class 20—various motors—was small but of a high class, including hot-air engines, gas and petroleum motors, wind mills, etc. An excellent showing was made in class 21—general machinery—no less than four grand prix being awarded the United States for pumping machinery, elevators, and pneumatic-tube system.

In Group V—electricity—while the number of exhibitors was not large, compared with those of Group IV, the quality was equally high, the United States showing the only radical improvements in the telegraph and telephone which were seen at the Exposition, each being rewarded by a grand prix.

The absence of large electric generators has been mentioned in the report of the director of the department, and the reasons given; but it is of interest to state here that the entire apparatus for the moving platform, and the electric road which paralleled it, was of American design and a large portion of it was manufactured in the United States. This, with the large electric unit in the French section referred to by the director, though both located outside the actual exhibit space of the United States, called the attention of visitors most emphatically to the work of the two leading American electrical manufacturing companies. The other classes of the two groups do not call for special remark outside of the description of their exhibits.

GROUP IV.—MACHINERY.

CLASS 19.—*Steam engines and steam accessories.*

Ball Engine Company, Erie, Pa.—This firm supplied the engine for the generating plant of the United States machinery building at Vincennes. The machine was of the tandem compound type, of 300 horsepower, and has been described in the report of the director of the department. From its installation to the completion of the period of the Exposition, it gave the greatest satisfaction, and, together with the electric generator of the Bullock Electric and Manufacturing Company, made a most economical and attractive plant.

Crane Company, Chicago, Ill.—The exhibit of the Crane Company consisted of valves, cocks, and fittings, screwed and flanged, in malleable, cast iron, and brass, also steam and gas fitters' tools; in all over 4,000 articles. These goods are for users of steam, gas, or water in pressures up to 2,000 pounds, and gave a very fair idea of the large number of sizes and great variety of the products of this company. One of the most interesting features of this exhibit was the display of valves, fittings, etc., for high-steam pressures up to 250 pounds. This company has made a specialty of this line, one of its largest departments being devoted exclusively to this and to piping equipments for power plants.

Luckenheimer Company, Cincinnati, Ohio.—This company exhibited a full line of its well known specialties for steam users. Prominent among these were the gate valves, which they have made it their special study to produce in their best form. These valves were shown in sizes up to 12 inches and in several different patterns. Besides the above, the exhibit included an excellent type of regrinding valves. The Luckenheimer Company has been making these valves for the past thirty-eight years, and the valves are considered by many the standard for this type in the United States. A complete line of check valves, improved pop safety valves, whistles, and a great variety of lubricators and oil cups for all purposes, were shown. This company claims to make all brass castings used in their goods from a special high-grade alloy to insure extra durability.

Walworth Manufacturing Company, Boston, Mass.—The square glass cabinet inclosing the exhibit of this company included a variety of excellent tools for the special use of gas and steam fitters, engines, etc., prominent among them being the solid Walworth diestock for cutting perfect threads at one operation, Miller's ratchet die plates, being a similar class of tools, but with a ratchet attachment; Stanwood, Walworth & Miller's pipe cutters, Hall's pipe wrenches for brass tools, an assortment of taps, dies, vises, etc., and a fine display of the different sizes of Stillson wrenches, ranging from 6 to 48 inches in length. These wrenches are largely used by steam and gas fitters all over the world for holding and turning pipes, bolts, nuts, and round surfaces. They grip firmly and release readily; admit of an easy adjustment to the relative position of different sizes of work and merely require slipping over the pipe or any other object to be held when the serrated movable jaw rolls and tightens its grip, but upon release of pressure the jaws become disengaged ready for a fresh grip, requiring no other change in the operation. The exhibit also included brass and iron valves, lubricators, oil cups, water gauges, and a great variety of brass fittings of all kinds.

CLASS 20.—*Motors moved by vapors other than steam.*

Mietz & Weiss, New York City.—This company exhibited a 4-horsepower kerosene engine direct connected with a multipolar dynamo. The engine is of ingenious construction, its chief feature being its automatic regulation, so that there is practically no change in speed between no load and full load on the dynamo. Another special feature of this engine is its ability to employ any form of petroleum as fuel, the engine in question being run at different times with crude oil, lubricating oil, and refined kerosene. This company also showed a 6-horsepower gas engine of excellent design.

Rider-Ericsson Engine Company, New York.—This company had on exhibition samples of four sizes each of their Rider & Ericsson hot-air pumping engines. A few of these operated every day, showing practically their method of piping water and affording opportunity of witnessing their peculiar good qualities. Chief among these may be mentioned their simplicity, safety, economy of maintenance, etc. These engines operate entirely without the assistance of any explosive or dangerous power. The system consists simply of heating air by the use of any fuel desired, the expansive force thus obtained being the propelling power. The construction and principles being so simple, the engines find a ready market as the means of water supply for country residences where skilled labor is not generally available.

CLASS 21.—*General machinery.*

The Batchellor Pneumatic Tool Company, Philadelphia, Pa.—This company showed a line of 8-inch tubes about 1,000 feet in length in operation in transferring carriers filled with mail matter and merchandise. The tubes, instead of being laid underground, were suspended to the girders of the building, about 18 feet from the floor, and were visible their entire length. They crossed the building four times, making various horizontal and vertical bends to illustrate the flexibility of the system. Both

the sending and receiving ends of the tubes were located within the exhibitor's space, so that a carrier could make a journey through the tube and return to the point of departure. This gave the visitor an opportunity to see the whole operation at a glance, and enabled him to compute the speed of the carriage. Compressed air for the operation of the tube was supplied by a Root positive blower, driven by an electric motor. The speed of the carrier was the speed commonly used in practice—about 30 miles an hour. To secure qualities of rigidity and accuracy the straight tubes are made of cast iron, bored on the interior; outside they resemble ordinary gas or water pipes, the joints being of the "bell and spigot" type, calked with lead and oakum. The bends are made of seamless brass tubing, bent to a uniform radius of 8 feet, with flanges soldered to each end, by which they are connected to the iron tubes. The carriers that are dispatched through the tubes are seamless steel cylinders, with a solid head upon the forward end, the rear end being closed by a hinged lid. These cylinders are 24 inches long and $6\frac{3}{4}$ inches in diameter. They are surrounded by two bearing rings that fill the space between the body of the carrier and the interior surface of the tube, thus forming a wearing surface to slide upon the tubes. The lid of the carrier is securely locked by three radial bolts thrown by a handle attached to the lid. The handle is so arranged that to lock or unlock the lid it must be swung until it projects beyond the periphery of the carrier. In this position it can be used to revolve a cam that throws the bolts. With the handle projecting the carrier can not be inserted in the tube, which prevents the carrier being dispatched with the lid unlocked. One of these cylinders will contain about 600 ordinary letters. The carriers are dispatched by means of an apparatus termed "a transmitter," which is partly automatic in its operation. It consists of two sections of the tube, supported in a swinging frame, so arranged that either section can be brought into line with the main tube, in which a current of air is constantly flowing. One of these tube sections maintains the continuity of the main tube, while the other is swung to one side to receive a carrier. In dispatching a carrier it is placed in an iron trough and then pushed into the open tube section. The frame carrying the two tube sections swings until the section containing a carrier is brought into line with the main tube, when the carrier is swept along with the current of air. While the frame is swinging from one position to the other the air is prevented from escaping by plates that cover the ends of the tubes, and a by-pass is provided so that the air current is not interrupted. An air motor, consisting of a cylinder and piston, operated by compressed air, furnishes the power to swing the frame, the operator having simply to move a valve by pulling a lever. When the controlling lever is pulled and latched the frame swings, and as the carrier passes out of the apparatus it trips the lever and the frame swings back automatically into position to receive another carrier.

In this short line at the Exposition there was no harm in dispatching carriers as rapidly as possible, but on lines several miles in length, especially where there are intermediate stations, it is necessary to allow a short interval of time to elapse—from five to fifteen seconds, according to circumstances—between the dispatches. To make sure that this interval is always allowed a time-lock device is attached to the transmitter, which locks the controlling valve for the required period as each carrier is sent. When the time interval elapses, if another carrier has been placed in the transmitter and the lever pulled, it will be displaced automatically. The time lock is simply an oil dashpot with a regulating orifice.

After traversing the circuit of tubes the carriers are received upon a semicircular table, so arranged that the friction created by the weight of a carrier and the centrifugal force in sliding around the table, brings them gradually to rest. The table is slightly inclined, so that when the carrier stops it will roll down out of the path of the following carrier. The end of the tube is open, allowing the carriers to come out freely, without stopping to operate any mechanism, but there is no escape of air

from the tube. This is accomplished in a very simple manner. Close to the open end of the tube a branch pipe leads off and is connected to the suction side of the blower, compelling the blower to draw its supply of air from the tube. Since it draws just as much air as it delivers to the tube, there is no inflow or outflow at the open end. This is one of the special features of the system.

Photographs illustrated the system as installed in the New York, Boston, and Philadelphia post-offices. The general post-offices in New York and Brooklyn are connected by a double line of 8-inch tubes laid across the suspension bridge that connects the two cities. The distance is $1\frac{3}{4}$ miles, and the carriers traverse this distance in about three and one-half minutes.

This system of pneumatic dispatch tubes is the invention of Mr. B. C. Batchellor.

Dresser, S. R., Bradford, Pa.—This exhibit, which belonged to the general exhibit of mining and metallurgy, Group XI, consisted of a series of sections of pipe lines showing the insulating coupling which is used to prevent the destruction of pipe by electricity. Other sections showed a friction coupling and patent clamp to stop leaks in leaded joints. A number of small models demonstrated the working of these couplings. Two small models illustrated the method of packing oil wells. The special feature of the exhibit was the demonstration of a perfectly tight pipe coupling. An experiment was conducted during the Exposition to demonstrate the merits of this pipe coupling, with the following result: On April 30, 1900, water was pumped into three lengths of 8-inch pipe connected with the insulating pipe couplings to a pressure of 300 pounds per square inch. On October 3, 1900, there had not been any visible leakage, notwithstanding the fact that during the hot days in July the pressure within the pipes so connected increased to 695 pounds per square inch.

The Ingersoll-Sergeant Drill Company, New York City.—One of the most extensive exhibits from the United States in this section was that of the above company. The exhibit, which was also a part of the mining and metallurgical display, Group XI, included air-compressing, mining, tunneling, and quarrying machinery, at both the Champs de Mars and Vincennes sections. In the Champs de Mars exhibit the company had one of its Class H compressors in operation, supplying air for all the pneumatic tool companies' exhibits. This compressor had duplex steam and compound air cylinders, the former being 12 inches in diameter with a 12-inch stroke, while the two air cylinders were 18 inches and 12 inches in diameter, respectively, also with a 12-inch stroke. The compressor had a capacity of 519 cubic feet per minute. This and one other engine were the only operating steam engines exhibited on the Champs de Mars by American builders. The engine was of the well-known Tange frame type mounted on a solid base containing a special cooler through which the air passed on its way from the low to the high pressure cylinder. In this way its temperature was reduced to normal, and the work required to compress a given volume of air considerably lessened. The cylinders were jacketed all around and in the heads, by which arrangement the air was further cooled and the working parts kept at a low temperature.

It was, however, at Vincennes that the chief exhibit of this firm was located. Occupying a space of 40 by 34 feet, in a prominent position, the company was able to show two compressors and all of its mining and quarrying apparatus. The largest compressor occupied one side of the space. It was a horizontal, cross-compound Corliss engine, with steam cylinders of 12 inches and 22 inches and a 30-inch stroke. The low-pressure air cylinder was $16\frac{1}{4}$ by 30 inches, and the high-pressure $10\frac{1}{4}$ by 30 inches. Between them was placed a Sergeant vertical intercooler. This device removes the heat resulting from compression in the first cylinder, and at the same time acts as a receiver or reservoir, from which the high-pressure cylinder draws. The smaller compressor, being of the "straight-line compressor" type, was also exhibited in Paris in 1878 and again in 1889. This compressor had a cylinder 14 inches in diameter with an 18-inch stroke, and a Meyer adjustable cut-off steam



D-11. WEST FAÇADE SALON D'HONNEUR, DEPARTMENT OF MACHINERY AND ELECTRICITY, FIRST FLOOR, CHAMP DE MARS.

valve. The air cylinder with piston inlet is $14\frac{1}{4}$ inches in diameter, with an 18-inch stroke. The air capacity of this compressor, when operating at 150 revolutions per minute, is 385 cubic feet per minute. Both compressors used steam at from 100 to 120 pounds, and furnished air at from 100 to 110 pounds, the machines having a volume of about 1,000 cubic feet of free air per minute. The compressors of this company were among the first apparatus in the entire Exposition to operate on the opening day, April 4, steam being furnished from the boilers which were installed by the United States Commission.

The Jeffrey Manufacturing Company, Columbus, Ohio.—The specialties of this company, which was a part of the general display of mining and metallurgy under Group XI, consisted of mining machinery operated by electricity and compressed air, and included coal-mining machines, both electric and mechanical compressed-air coal cutters, rock drills, and electric locomotives. One of the chief features of the exhibit was a 17-A electric-chain coal-mining machine. The makers claim that this machine is designed to meet very general conditions and will withstand the heavy work required in mines where the cutting is very hard and where much power is consumed. The strength of this machine is valuable, in connection with its lasting qualities, in order to reduce repairs and supplies to a minimum. Each machine can be handled by one machine runner and one helper, and is capable of cutting from 100 to 300 linear feet face per day, depending upon the conditions which the machine is operating under. A No. 16-D air-chain machine was shown, well adapted for use in both thick and thin veins of coal, and embodying most of the features of the electrical machine, with the exception of the method of applying the power. It was equipped with two 5 by 6 compressed-air engines, which were especially designed for heavy duty. This machine is built in three sizes, to undercut either 5, 6, or 7 feet, 39 to 44 inches wide, and weighs, complete, about 2,000 pounds. This machine was shown supplied with a self-propelling truck.

The Jeffrey long-wall machine is built of steel, no iron being used in its construction. The cutting is done by means of bits or cutters inserted in the periphery of the cutter wheel. In order to follow the variations in the floor of the mine the wheel swings on a bearing in such a way that it is adjustable in a horizontal plane. This is known as the single-track long-wall machine, as only a single rail is required.

This company also exhibited a new type of the heavy, powerful, electric locomotive for mine and surface haulage.

Besides the above-described apparatus this company showed a large number of pressed-steel elevator buckets of all shapes and sizes, wrought-iron screw conveyors, a full assortment of chain belting, and sections of troughs for different kinds of elevating and conveying machinery.

The Robbins Conveying Belt Company, New York City.—This company made an exhibit of extremely interesting and practical apparatus for conveying ore, coal, ashes, or any like material, and was represented both on the Champ de Mars and at Vincennes. A two-belt conveyor, having a maximum capacity of about 250 tons of coal or ore per hour, and a moving tripper for distributing the material carried into different bins, the whole being operated by an electric motor, was exhibited at Vincennes. This system of conveying is in very extensive use in mines, large manufacturing plants, etc., and has been found very practical. It consists of a rubber belt of special construction, which runs in the form of a trough on specially designed idlers; bearings are internally lubricated in such a way that the grease oozes out and prevents the dust from entering. The conveying belts are separated thoroughly from the idlers. The apparatus exhibited operated constantly from the 15th of May until the close of the Exposition. There was no stoppage of the conveyor during this period by reason of breakdowns or the necessity of repairs. The conveyor transported gravel at the rate of 150 tons per hour, and the tripper automatically distributed this amount evenly throughout a series of five bins.

The Rand Drill Company, New York City.—This company, whose exhibits also came under the department of mining and metallurgy, Group XI, showed a very complete line of high-grade air compressors, rock drills, and coal cutters, and also a special compressor used by the Tripler Liquid Air Company in the production of liquid air. The exhibits on the Champ de Mars were: One high-pressure air compressor, having cross-compound condensing horizontal steam cylinders 10 and 18 inches in diameter by 10-inch stroke, and three stage vertical air cylinders 10, $5\frac{5}{16}$, and $2\frac{3}{8}$ inches diameter by 10-inch stroke, compressing air to 2,500 pounds. This is the machine which supplied the compressed air to the Tripler Liquid Air Company. Here also were shown several styles of rock drills with tripods, tunnel columns, and stopping bars. At Vincennes the exhibit consisted of one Corliss compound condensing compressor with 14 and 26 inch steam cylinders, 13 and 22 inch air cylinders, with 24-inch stroke. This compressor was run with 100 pounds steam pressure, and furnished air at 100 pounds to the square inch, developing about 300 horsepower. In connection with this machine was one Wheeler admiralty surface condenser; one 12 by 16 inch straight-line air compressor, steam driven; one 10 by 14 inch straight-line air compressor, driven by Pelton water wheel, and one Type V navy compressor, the same as furnished to the United States Government for torpedo service, designed for 1,700 pounds air pressure. Besides these, a complete assortment of drills and mountings, a pneumatic driftbolt driver, and pneumatic post hammer, sets of hose, drill sharpening tools, etc.

Tinius Olsen & Co., Philadelphia, Pa.—The exhibit of this firm showed a complete testing laboratory for determining the physical properties of structural material, tests which may come under the more general heads of tension compression, transverse, impact, torsion lubrication, and viscosity. The exhibit comprised the following machines: One 50,000-kilogram testing machine, one 15,000-kilogram testing machine, one 5,000-kilogram wire tester, one impact tester, one torsion tester, one 1,000-kilogram cement tester (automatic), one 100-kilogram cloth tester, one Cornell oil tester, one Olsen oil tester. Besides these, numerous measuring instruments and the Carpenter "viscosimeter" were exhibited.

The special features of the exhibit were the 50,000-kilogram testing machine, the torsion tester, and the oil tester. The largest machine was provided with the Olsen automatic micrometer recorder. By means of this instrument the stretch within the elastic limit is clearly shown on the diagram, magnified 500 times, so that measurements could easily be read to the one ten-thousandth part of an inch. The same screw that operated the poise on the scale beam also operated the pencil of the recorder; thus scale readings and diagram readings were sure to correspond. Without the micrometer attachment the machine records automatically the elongation of the specimen tested, magnified five times, which is sufficient to show the elastic limit of the material tested. The autographic apparatus remains in contact with the specimen throughout the test, so that the stretch to the point of rupture can be determined directly from the curve inscribed by the pencil. The torsion tester was of a size to test shafting up to $2\frac{1}{2}$ inches in diameter. The total testing capacity of the machine (250,000 kilograms C. M.) was graduated directly on the beam, and all tension spring that might have been produced was taken up in the machine, the gripping head being free to move in a longitudinal direction.

The Cornell oil tester, invented by Prof. Rolla A. Carpenter, contained many principles not found in other machines, such as the reciprocating motion of the journal and capacity for durability test of metals as well as of oil, while the Olsen oil tester is automatic in its action, pressure and friction readings being visible on spring balances. All machines exhibited were of new models and comprised instruments of the greatest precision for determining elongation or compression of materials within the elastic limit.

CLASS 22.—*Machine tools for working in metal and wood.*

E. C. Atkins & Co., Indianapolis, Ind.—This firm exhibited a very complete line of its well-known saws, presenting them to the public in a most attractive manner. Among the specialties shown were 2 by 6 and 12 inch band saws, and circular saws up to 72 inches in diameter.

Bement-Miles & Co., Philadelphia, Pa.—These well-known manufacturers of large machine tools presented a very complete line of their products, including a vertical milling machine, one cotter drill and key-seating machine, one horizontal boring and drilling machine, one 18-inch slotting machine, and one 79-inch double driving-wheel lathe. Besides these there was also exhibited one 1,100-pound single-frame steam hammer. The exhibits of this company were displayed in conjunction with those of the Niles Tool Works Company and the Pond Tool Company, these firms having been affiliated under one management.

Brown & Sharpe Manufacturing Company, Providence, R. I.—This exhibit did not include all of the machines built by their company, but there were several sizes of the principal types of machines built by it. All of the machines, as well as the smaller tools and sample work, were taken from regular stock, and not finished for exhibition purposes. The exhibit consisted of 21 machines, of which 12 were belted so that they might be seen in motion, and eight machines were in operation producing work. Among the latter was an automatic gear-cutting machine, suitable for cutting spur gears to 72 inches in diameter; a plain milling machine arranged for cutting steel pinions for street-car motors; a plain grinding machine grinding a roll; a surface grinding machine at work upon flat surfaces, the work being held upon a magnetic chuck; a cutter grinding machine, and three automatic screw machines, one of which was at work constantly making, from a brass rod, three collar buttons per minute, the buttons being distributed among interested visitors, 35,000 being given away during the Exposition.

In addition to the machines above mentioned, there was a measuring machine such as is used for determining the diameters and length of standard gauges. With this machine it was possible to measure as closely as one ten-thousandth of a millimeter, or about four-millionths of an inch. This machine was of much interest to those familiar with such matters. The gear models, consisting of a combination of all styles of gearing, such as spur, bevel, spiral, internal, intermittent spur, intermittent bevel, worm wheel, worm rack, sprocket wheels and chain, mounted and operated by a hand wheel or belt, attracted much attention from mechanics. There were also show-case exhibits, occupying a length of 66 feet, and containing a large assortment of milling and other cutters, verniers, calipers, etc. The motive force was supplied by a 15-horsepower electric motor, placed on a platform at the height of the overhead works for the machines.

The exhibits at the Champ de Mars and the Esplanade des Invalides were quite small. The one in the machinery section of the machinery and electricity building consisted of a universal milling machine, a universal grinding machine, and an automatic screw machine; also a show case containing an assortment of the various styles of cutters and accessories to machines, with a few small tools. In the liberal arts department there was a show case containing the various styles of micrometer calipers, vernier calipers, drafting scales and tools for accurate measurements, and in the building for industries diverses, Esplanade des Invalides, there was also a show case containing various styles of hair clippers.

The E. W. Bliss Company, Brooklyn, N. Y.—The most extensive exhibit in presses and dies for producing various forms of metal work was that of the above company, which filled a large space at both the Champ de Mars and Vincennes. The exhibit included one complete outfit for manufacturing petroleum tins; one outfit of automatic presses for manufacturing electric-lamp sockets; one outfit of automatic

presses for manufacturing bottle caps; automatic feed presses for the links of bicycle chains; large presses for punching various forms of metallic disks, besides many automatic machines for special uses in the manufacture of small metal articles. Among the most interesting of these machines was a No. 102 Bliss automatic press, performing five operations simultaneously, the handling of pieces from die to die being done by the machine itself. The capacity of the machine was about 240 to 300 operations per minute, which, the makers claim, on work of this kind, equals the output of about 20 operators with 20 presses of the usual type. Another most interesting machine was the automatic can-body forming and seaming machine. The body blanks, after being laid on the table, are automatically carried into the machine, which forms the two hooks, shapes the body—round, oval, square, etc.—unites the hooks, stamps down the seam, and throws out the finished body at the rate of about 60 per minute.

The Bethlehem Steel Company, Bethlehem, Pa.—This company exhibited a large lathe in actual operation, turning steel with cutting speeds much faster than ever before accomplished. Three grades of steel were turned off in the lathe with a standard depth of cut and feed. A depth of cut of three-sixteenths of an inch and a feed of one-sixteenth of an inch was selected as a standard cut, as it represented about the average of general practice. Three grades of steel—soft, medium hard, and very hard—were selected as best suited to show the range of adaptability of the tools to all classes of work. With this standard cut the soft steel was turned off at a speed of 150 feet per minute, the medium hard steel at a speed of 60 feet per minute, and the very hard steel at a speed of 15 feet per minute. These results were obtained with tools made by a new process which imparts to the steel of which they are made the property of cutting at a very high working heat—that is, a tool retains a hard cutting edge when heated to a visible red heat. The process is the invention of Messrs. F. W. Taylor and Maunsel Hoyt, employees of the Bethlehem Steel Company.

Chicago Pneumatic Tool Company, Chicago, Ill.—This company exhibited a very large assortment of pneumatic tools of all kinds, chief among them being drills and riveting hammers. Most conspicuous among the hammers were the long-stroke riveting hammers, made in two sizes, and claimed to be the most powerful hand hammers yet produced. They are used for all kinds of riveting, including high-pressure steam-boiler work. These hammers have a stroke of piston of 9 inches. They are used to drive from 1 to 1½ inch iron or steel rivets in heavy boiler work and the larger rivets in ship construction. The hammers are comparatively light, easy to hold, and are free from vibration. They are provided with an automatic stopping device, which prevents the hammer from working unless held firmly up to the work, thus obviating accident or loss of piston or rivet set should the air be inadvertently turned on when the hammer is not in operation.

There were also exhibited several different sizes and kinds of yoke riveters; also shell and deck riveters, compression riveters, mud-ring riveters, and bridge and girder riveters. Under the head of drills, there were about twenty different sizes and styles of pneumatic drills, from the smallest breast drill, with a capacity of three-sixteenths of an inch, up to a 10-horsepower motor drill. These included reversible drills for both wood and metal and rock drills of several kinds and capacities. Besides these, there were shown single and duplex steam and belt driven compressors, also gasoline and electrically driven compressors. A great number of small tools and apparatus especially designed for the class of work undertaken by this company completed the exhibit within the buildings.

In connection with the exhibit at Vincennes, this company showed, out of doors, a large portion of the hull of a steel boat, where all sorts of pneumatic appliances were exhibited in actual operation in ship construction. This proved a most inter-

esting and instructive portion of their installation, and was visited by many people during the Exposition.

The Cincinnati Milling Machine Company, Cincinnati, Ohio.—The feature of this company's exhibit was its universal milling machine with automatic tubes in all directions. This machine is provided with a new feed mechanism by which an operator is able to obtain 16 different feeds for the table without changing belts, pulleys, or gears. The support for the cutter arbor is novel. The arbor can be supported as close to the cutter as the work will admit. The machine is furnished with an oil base which keeps oil and drippings from the floor. A can-cutting attachment for cutting face and cylindrical cans and a vertical milling head for milling vertical surfaces, and revolving small cutters at high speed were exhibited with this machine.

The Deering Harvester Company, Chicago, Ill.—This concern exhibited in class 22 several machines designed by their engineer for producing automatically various portions of their harvesting apparatus. The most interesting of these machines was the one for serrating sickle sections. Each machine is capable of serrating 4,000 sections in a day of ten hours, and one attendant can operate six machines.

The blank sections are placed in a vertical hopper, from which each one in turn is fed from the bottom to a position on an anvil block, and there gripped and held during the operation of serrating. When in place, one of the serrating hammers, provided with a cutting chisel and mounted upon a traveling carriage, starts at one edge of the blade and travels forward, cutting the serrations at a rapid rate. When this is a little in advance, the opposing carriage starts and takes its hammer with cutting tool along the other cutting edge of the section being operated upon. By the time this second cutting device is well started in its work, the first one has finished its course and receded, thereby leaving room for the second hammer to finish its part of the work. The saving of labor over the original hand methods is about ten fold, and the saving over the manually operated serrating machine is about four hundred fold. Other machines were shown for automatically producing the pins and rods of uniform length used in the roller bearing of agricultural machinery, as well as a machine for automatically pointing and threading bolts.

William S. Doig, Brooklyn, N. Y.—This exhibit consisted of box-nailing machines of various sizes and patterns; the chief interest centering in a machine which nails and cleats a box at the same time. This machine has two complete feeders, nails of different sizes being used, thus saving much time in the shop when a great variety of work is being turned out. By removing the clinching block there remains a complete nailing machine suitable for framing or placing bottoms in boxes of great variety and size.

The J. A. Fay & Egan Company, Cincinnati, Ohio.—The exhibit of this company in woodworking machinery was probably the most extensive of its kind in the entire Exposition, and comprised complete series of machines for manufacturing a great variety of articles. It will be sufficient to enumerate the machines shown and the product of each machine to give an idea of the great variety and large field covered by the products of this company. The exhibit comprised one No. 2 30-inch circular resaw used for sawing lumber with either a straight or bevel cut; one No. 10 improved double-end tenoner for tenoning both ends of material at the same time and cutting it to accurate lengths; one No. 9 band resawing machine for resawing all kinds of lumber to the thickness desired; one No. 5½ band sawmill used for sawing through the center of logs up to 40 inches in diameter, an adjustable carriage allowing the machine to saw up logs of all kinds and all lengths; one No. 1 swing cut-off saw for cutting off lumber accurately in whatever lengths desired; one automatic glue jointer for making the very best glue joints for furniture with cheap labor; one double emery wheel stand for doing all kinds of grinding; one No. 2½ automatic gauge lathe for duplicating any pattern of chair stock and for fancy straight turning; one new box-board matcher, with gluing attachments, for making close-fitting box

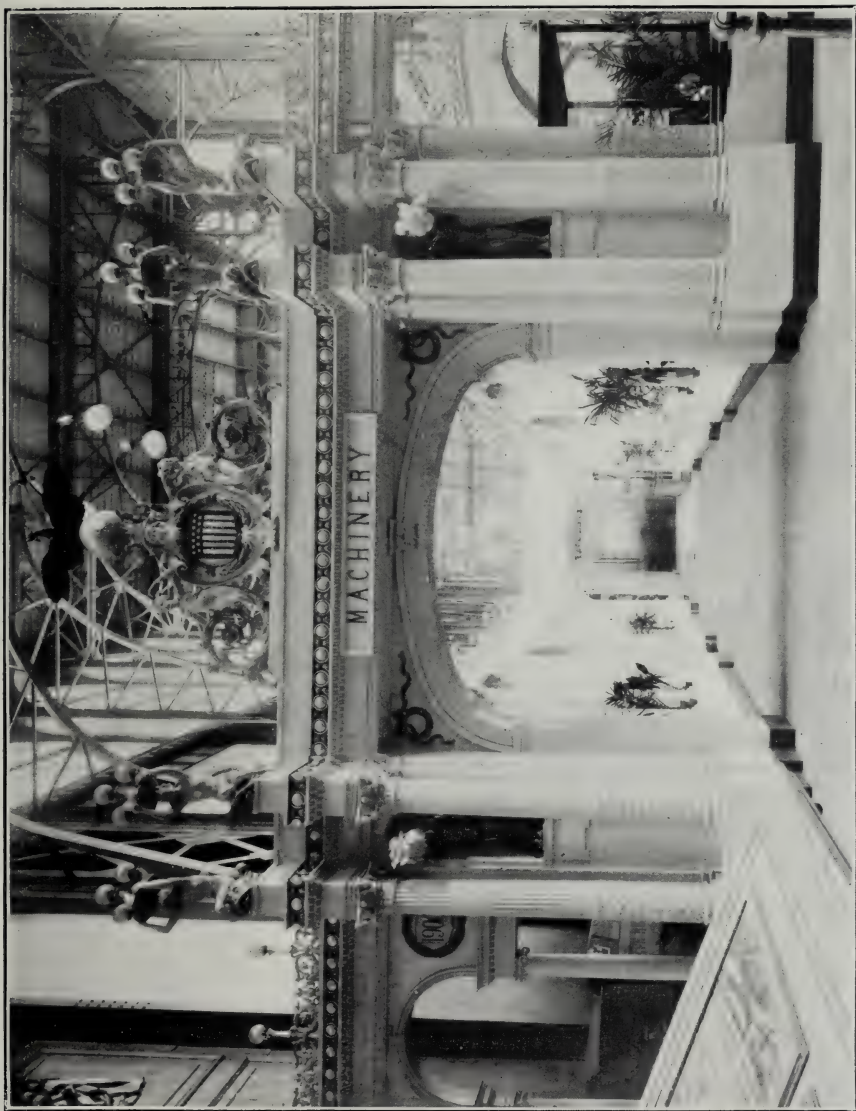
edges for first-class boxes; one No. 2 hand-feed rod machine for making long dowels or chair rounds of any length desired; one No. 5 spindle vertical car-boring machine for boring holes in heavy car or bridge timbers, either straight or at an angle; one No. 4 triple-drum sander for finishing any flat surface and polishing it in a superior manner; one No. 4 variety wood worker, which does a great variety of work, such as planing, matching, jointing, ripping, plowing, etc.; one No. 19 extra heavy planer and smoother for finest quality work; one 32-inch automatic knife grinder for grinding and sharpening straight knives; one No. 4 improved extra heavy hand planer for jointing and planing the edges of boards for furniture and pattern work; one No. 4 combination rip and crosscut saw for universal sawing; one No. 4 vertical hollow-chisel mortiser for mortising and boring very large heavy car and bridge timbers; one No. 11 new special heavy large four-sided molder for working on four sides of heavy hard wood and turning out the highest grade of work; one No. 17 triple-cylinder lightning flooring machine for working either soft or hard wood flooring or ceiling at a very high rate of speed and giving it a superior finish; one No. 5 large car tenoning and gaining machine for making either single, double, or triple tenons in heavy car or bridge timbers and for cutting off and gaining; one No. 7 new double-spindle edge molding and shaping machine for molding or shaping the edges of heavy stock; one No. 2 self-feed band rip saw for ripping stock at a very high rate of speed; one automatic band setting machine and filing frame for setting teeth more accurately than they could be set by hand; one standard wood-turning lathe for ordinary turning by chisels; one No. 3 new 14-inch sand-belt machine for rapidly sanding the corners of drawers, boxes, etc.; one No. 2 single-spindle friezer for shaping and friezing the edges of light stock; one No. 2 Centennial surface planer for planing one side of 20-inch material; one double emery wheel stand for general grinding; one No. 2 hand-feed knife for grinding planer knives; one No. 1 variety saw, iron table and tilt, used for a great variety of purposes; one improved spindle carving machine for making fancy carvings on panels; one improved No. 0 patent band saw for outside scroll sawing, pattern work, etc.; one No. 3½ tenoner for tenoning one end of the piece of stock and coping it to fit in molding; one No. 2 automatic dovetailing machine for cutting the dovetail into two pieces of material in one operation; one No. 7 30-inch pattern-maker lathe; one No. 2½ vertical spindle and disk sander for sanding flat surfaces and also corners; one No. 2½ compound-bed sash and door mortiser for mortising the holes in sash and doors to receive the tenons; one No. 6 column-fret scroll saw for use in inside scroll sawing, and one automatic band saw-setting machine for setting two teeth of a band saw at one stroke of the hammer.

Most of these machines were shown in operation, either at the Champ de Mars or at Vincennes, and made a most complete and interesting exhibit.

The Gisholt Machine Company, Madison, Wis.—This company exhibited the Gisholt turret lathes and tool grinders in several sizes, and all in operation. This company makes a specialty of this line of machinery. The Gisholt lathe is unique among turret lathes in point of size and capacity for work.

The Ingersoll Milling Machine Company, Rockford, Ill.—The exhibit of this concern consisted of one standard horizontal spindle milling machine, 36 by 36 inches by 8 feet. The table is adjustable by power in either direction. The cross rail is raised and lowered by power and is counterbalanced. The exhibit also included a horizontal spindle milling machine, 20 by 20 inches by 8 feet. The outer housing of this machine is removable and makes the machine open-sided. The saddle is counterbalanced and the table has a quick hand adjustment in either direction.

The Niles Tool Works Company, Hamilton, Ohio.—The exhibit of this well-known machine tool company consisted of a 51-inch boring and turning mill, a vertical drilling machine, a universal radial drilling machine, a 10-foot boring and turning mill, and an 18-inch shaping machine and horizontal boring, drilling, and milling



D-12. NORTH AISLE (AND ITS ENTRANCE THROUGH FAÇADE) SALON D'HONNEUR, DEPARTMENT OF MACHINERY AND ELECTRICITY, FIRST FLOOR, CHAMP DE MARS.

machine. The universal radial drilling machine has a 2-horsepower electric motor mounted on top of column; the armature stands in a vertical position and drives the machines through spur gearing and also drives the arm elevating gears by clutches. At the base, convenient to the operator, are placed the automatic stopping box and reversing switch. These drills are so constructed that the floor is left entirely clear and the arm may swing to any point. There are no belts or driving gears to interfere with placing the work. The weight of the column rests on ball bearings and turns freely. The feeds are operated by a rack and pinion and the spindle is counter-weighted so that it may be readily used for tapping. The 18-inch shaping machine has a cutting bar of 18½-inch stroke and a quick return movement. The saddle has 60-inch traverse movement on the bed, which is 7 feet long. The feeds are cross, down, angular, and circular for convex or concave work, and all operated by power. The machine throughout is unusually heavy and powerful.

The Morgan Machine Company, Rochester, N. Y.—This company showed box-nailing and lock-corner box machinery. The lock-corner exhibit consisted of three machines, corner cutter, setting-up machine, and trimmer. This system is unique. The makers claim that it is the only one of its kind in existence, and is used in all parts of the world for making what are termed "stock boxes."

The McCormick Harvesting Machine Company, Chicago, Ill.—The exhibit of this company in class 22 consisted of two automatic machines, one for nut tapping and the other for bolt threading, which have been specially designed for use in the manufacture of harvesting machinery. The nut pattern machine is of ingenious construction. The nuts are shoveled into a hopper having compartments which discharge the blanks upon a rapidly rotating disk, from which chutes lead to the tool spindles. This disk reverses its rotation at intervals to break up any compacted masses of nuts that may have formed at the entrance to the chutes. The tool spindles are arranged around the feed disk and can be increased to as many as are wanted, four being the number used on the machine exhibited. The tool spindle advances into the blank while doing its work as rapidly as the tool can cut, but automatically changes to a much greater speed as it withdraws. The automatic bolt-threading machine consists of a hopper with a vibrating plate operating in such a manner that the bolts are dropped into a chute, down which they slide to the tool spindle. The device for holding the bolt, while it is being acted upon, as well as the particular form of feed, are considered the essential features of the machine. The tool spindles operate with a slower motion as they advance, and accelerate as they withdraw from the bolt. These machines were designed by Mr. James H. Haskins.

The Norton Emery Wheel Company, Worcester, Mass.—Besides a very complete assortment of emery wheels and corundum wheels for all forms of grinding and sharpening, this company exhibited the Walker universal tool and cutter grinder, a machine designed for manufacturers who require high-grade universal grinders of medium size, and at the same time wish to cover the field for a good cutter and reamer grinder. A line of standard grinding machines was also exhibited.

Pond Machine Tool Company, Plainfield, N. J.—The exhibit of this company consisted of a 6-foot radial drill, a 42-inch planer, a 42-inch lathe, and a 6-foot boring mill.

Pratt & Whitney Company, Hartford, Conn.—These well-known manufacturers of small machine tools made a most complete and interesting exhibit of their products. Chief among these was a precision bench lathe and milling machine with attachments; a 600-M M standard measuring machine; standard cylindrical size gauges and templets; standard drop-forge steel caliper gauges; international standard screw-thread gauges, 6 to 50 millimeters diameter; standard reamers, for machine shop and locomotive work; standard taper pins; milling cutters with formed and inserted blade; metal slitting saws; international standard taps and dies; ratchet drills; lathe tools; combination lathe chucks; 10-inch tool-maker's lathe; 14-inch engine lathe;

42-inch gap lathe; centering machine; cutting-off machine with increased speed mechanism; die-sinking machine; adjustable multi-spindle drill; cup and cone and cutter grinding machines, with horizontal and vertical spindles; 4-foot by 18-inch tool-room planer; 14-inch tool-room shaper; gun barrel drilling machine; gun barrel rifling machine; hand turret head-screw machines; 14-inch turret head-chucking machine, with brass working tools; 16-inch turret head-facing and chucking machine; 16-inch turret head-chasing lathe; automatic turret head-screw machine with tools for rod work; automatic turret head screw machine with magazine attachment.

The Q. & C. Company, Chicago, Ill.—This company exhibited pneumatic tools, including saws, hammers, etc., pneumatic hoists, and various applications of this class of tools, riveting, chipping, sawing, and hammering. Besides the riveters and hammers of a more or less familiar pattern, the pneumatic hoists and the Bryant saws were chief features of the exhibit. These hoists are made in a great variety of sizes and for many purposes, being used for handling small parts of machines too heavy to be moved by hand and not large enough to warrant the use of a machine-shop crane. They are either suspended from the girders of the shop or from arms attached to the uprights, and are in some cases mounted on a four-wheel truck in such a manner as to be easily portable. The Bryant power metal saw is desirable for cutting rolls, structural steel, or steel castings. The saw blade cuts $9\frac{1}{2}$ inches above the side table, and the carriage traveling 26 inches, enables long cuts to be made in that position. The Bryant principle of driving renders a large proportion of the blade available for cutting. The feed is variable and can be changed without stopping the machine. An automatic stop is provided, which stops the saw at any desired position. The machine exhibited was driven by a direct connected electric motor, but a belt drive can be used as well. An important item of exhibit consisted of a series of friction jacks for lifting heavy weights. These are used extensively for surfacing tracks in railway construction. The lifting is accomplished entirely by a friction dog, which can be released upon the approach of a train and the jack removed from under the rail. These jacks are capable of lifting 10 tons.

F. E. Reed Company, Worcester, Mass.—The exhibit of this company consisted of engine lathes, to which type of machinery it devotes itself exclusively. These lathes are made for both belt drives and foot power for small shops. A 10-inch wood-turning lathe which was shown was designed especially for use in manual-training schools, and is the result of many years' experimenting.

Rockwell Clough Company, Alton, N. H.—The exhibit of this company consisted of machines for automatically manufacturing corkscrews of various sizes and designs. This machine takes the wire as it comes from the mill, straightens it from the coil, cuts, bends, and twists the same into the form of an exceedingly well-made and strong corkscrew. It unites this corkscrew solidly to a handle of wood or other material of any desired shape or size. One boy with this machine can produce 5,000 corkscrews per day. The exhibit attracted a good deal of attention from the public, as well as from engineers, who were impressed by the ingenuity of the mechanical movements shown.

Rice Gear Company, Hartford, Conn.—This concern exhibited a gear cutter of novel design, producing gears, which are claimed to be theoretically correct, at a speed from three to five times faster than any other machine which does equally correct work. This machine is used to produce the gears of one of the largest bicycle and automobile manufacturing companies of the United States and was developed practically in the factory of that concern.

H. B. Smith Machine Company, Smithville, N. J.—The exhibit of this company consisted chiefly of a complete outfit of woodworking machinery for the manufacture of sashes, doors, and blinds, and comprised some fifteen different forms of apparatus. Among these may be mentioned a 24-inch surface-planing machine to plane material up to 8 inches in thickness; a surface-planing machine 20 inches wide; a universal

saw bench with boring attachment and table; a hand planing machine or jointer; a No. 2 band saw with 36-inch wheels; a 6-inch molding machine for finishing stock on four sides, a heavy outside molding machine, and an inside molding machine; a triple-drum sander for polishing smooth surfaces; a double-spindle shaping machine; a single-spindle horizontal boring machine; a No. 2 double-end tenoning machine with double cut-off saws; a No. 2 tenoning machine, single end, with roller-bearing table, and two power mortising machines with boring attachments. Besides this a single-spindle shaper with friction counter was shown, the whole making a very complete and satisfactory installation for this class of work.

Simonds Manufacturing Company, Fitchburg, Mass.—These well-known saw makers exhibited a remarkably complete collection of saws and knives, in all some 600 varieties. These included handsaws, varying in size from 24 to 72 inch crosscut saws, showing teeth used in different parts of this country; the so-called Goold tooth, as used in Australia, and teeth which this company places in saws for use in Europe. There was also exhibited one sample each of gang-mill, muley, and drag saws. Besides these there were circular saws, concave saws, miter saws, groover saws, and a nest of small circular saws having various kinds of teeth. The knives included a great variety for special purposes, such as rag-cutter knives, pulp knives, fur-cutting knives, bookbinders' shear blades, etc. A feature of the exhibit was what was claimed to be the only double-edge band saw in Europe at the time of the Exposition. This saw was 14 inches wide, 15 gauge, and about 50 feet long. Another unique article was the largest veneer knife made in one forging. This knife measured 168 inches in length by 9 inches in width and three-fourths of an inch in thickness.

Warner & Swasey, Cleveland, Ohio.—This firm exhibited a number of their well-known high-grade machine tools. The following were the machines shown: One hollow hexagon turret lathe; one No. 4 screw machine (friction back gears and automatic feed to turret slide); one No. 1 screw machine; one No. 2 universal monitor lathe (friction back gears); one No. 30 vertical turret machine; one horizontal boring machine; one No. 2 screw machine; one No. 12 forming monitor lathe; one No. 12 double-head key lathe; one No. 2 spindle-valve milling machine, and one cock grinder. The feature of this exhibit was the hollow hexagon turret lathe. This is a new machine for turning iron and steel bars up to 2 inches in diameter and 24 feet long. The head is cast solid with the bed. The stock is advanced automatically by a special roller feed operated by the longest of the levers shown in front of the head. The roller feed is worked independently of the power for driving the machine, and therefore more quickly. A single screw adjusts four different diameters of stock, both the four stock guides and the two rolls of the roller feed. The bushings for the master collet of the automatic chuck are held firmly in place and yet can be quickly removed and replaced without loosening the chuck head. The turret is hexagonal in shape, the inner and outer walls being parallel, thus providing an exceptional opportunity for rigidly supporting the tools. The index is the full diameter of the turret. The independent adjustable multiple stocks are conveniently placed in front of the saddle; the turret slide is worked by rack and pinion in the center of the "V" ways and is engaged or disengaged by a single lever. A full set of tools, including turning tools, forming and cutting-off tools, dies, and collets, accompanied the machine.

GROUP V.—ELECTRICITY.

CLASS 23.—*Machines for generating and using electricity.*

Bullock Electric Manufacturing Company, Cincinnati, Ohio.—The exhibit of this company consisted of the 200-kilowatt electric generator direct connected to the Ball compound engine, which comprised the power plant of the United States machinery

building at Vincennes. Besides this generator the company showed in its exhibit space on the Champ de Mars a number of smaller generators and motors. Chief among these may be mentioned the Type I generators for direct connection and Type N motors for general power purposes. These latter motors are ironclad and are used for a great variety of purposes where a strong, simple, and efficient motor is essential, such as direct connection to machine tools of all types, printing presses, looms, and other classes of general machinery. In this connection it may be mentioned that the Bullock company has a special method of control for their power motors known as the "teaser system," which employs various voltages to alter the speed of the motor, instead of inserting resistance in the motor circuit. An interesting feature of the machinery manufactured by this concern is the marine type generators direct connected to the Forbes engines. These generators are made in sizes from $2\frac{1}{2}$ kilowatts to $22\frac{1}{2}$ kilowatts, and range in weight for the combined unit from 530 pounds to 4,400 pounds. They are extremely compact, taking up the smallest possible amount of space in a ship's engine room, and are noiseless. This type of machine has become quite popular for yacht lighting as well as general marine work.

The Lorain Steel Company, Lorain, Ohio.—The exhibit of this company exhibited trucks for street-car equipments, together with the electric motors, controllers, etc., necessary for the complete outfit of electric cars. Two types of street-railway motors were shown, one of 25 horsepower for ordinary equipment and one of 50 horsepower for high-speed interurban service. These motors, while excellent in design, presented no remarkable or unusual features. The controller shown with these equipments was of the electric-brake type and provided with an extra cylinder, which, operated when the power cylinder has been brought to the "off" or open-circuit position, places the motors in such connection that they act as generators driven by the momentum of the car. The current generated by them is absorbed by the car resistance. This absorption of the car momentum into electrical energy naturally brings the car to rest, and the speed of the top is regulated by the speed at which the brake handle is used, through its various positions, to reduce the amount of the car resistance included in the brake surface. On the last position of the brake handle none of the resistance is in circuit, and if the handle was brought suddenly to this final position an emergency stop is thereby made. The brake cylinder is furnished with its own magnetic blow-out coil, which is automatically cut out of circuit, except when the brake cylinder is in use. To prevent any possibility of mishandling the controller, the various cylinders are ingeniously and effectively interlocked so that it is impossible to operate any cylinder except when both the others are in such position that no confusion of circuits can occur.

Ward-Leonard Electric Company, Bronxville, N. Y.—This company exhibited about 1,000 different typical forms of its rheostats and circuit breakers, three different styles being of the standard type of Ward-Leonard enamel field rheostats. In cases of field rheostats, dimmers, and many other forms of rheostats having the resistance continually in circuit the resistant wire is attached by vitreous enamel to a cast-iron plate. The rheostat contacts are also embedded in the enamel. In the case of motor starters and other similar types in which the resistance is only occasionally inserted, the resistance material consists of a thin ribbon and is embedded in a mass of pure silicious sand in a cast-iron box. This makes a very compact, simple, and substantial starter, which is entirely fireproof. The automatic switch makes it impossible for the operator to start the motor improperly. Any improper manipulation of this starter causes it to open the circuit and keep it open until it is used properly. The Ward-Leonard circuit breaker can not be closed when an overload or short circuit exists on the line. There are two independent switch arms which are closed one at a time. If the operator attempt to close the circuit breaker when a short circuit or overload condition exists, the automatic device opens the first switch closed as soon as he attempts to close the other switch.

CLASS 25.—*Electric lighting.*

General Electric Company, Schenectady, N. Y.—This company had two distinct exhibits, one in the palace of electricity and the other in the army and navy building. Besides these two exhibits a great many of the historical objects exhibited in the retrospective exhibit of machinery and electricity were loaned by the General Electric Company to the United States Commission for display in the Salon d'Honneur. In various parts of the Exposition, though not exhibited by the company itself, apparatus of the General Electric Company was to be found. Various machine tools in the American machinery building were driven by this company's motors. The exhibit proper consisted of a model of the factories and workshops of the company, and twenty large photographs. The model was a representation on one framework of its three factories in Schenectady, N. Y., Lynn, Mass., and Harrison, N. J., made to the scale of 1 inch to 20 feet. The buildings, painted in the natural colors, were made of sheet copper, and the windows of transparent mica. The entire model, 18 by 7 feet, rested on a pedestal, and was lighted from below by 50 incandescent lamps, the light showing through the mica windows of the buildings and producing a very attractive effect. It was surrounded by a nickel railing and surmounted by a narrow colored canopy, supported on four nickel uprights from the four corners of the railing. The model was also lighted from above by three rows of incandescent lamps. Both sets of lamps were controlled from a small switch board within the company's space. The twenty large photographs were placed on ten easels, two photographs on each, and arranged in two rows. The photographs were made from direct negatives, 26 by 40 inches in dimensions, and showed interior views of the company's works. The entire space was covered by a red carpet and luxuriously furnished with easy chairs, table, desk, etc., which made it an agreeable resting place to the various visitors. The company's exhibit in the army and navy building is described in detail in the report of the army and navy exhibit, and a description of the articles loaned to the retrospective exhibit of machinery and electricity will be found in the special report of that exhibit.

CLASS 26.—*Telegraphy and telephony.*

Thomas A. Edison, New York.—Although exhibited under the name of Thomas A. Edison, the apparatus shown in this section was the product of the Edison Manufacturing Company and the National Phonograph Company. The exhibit consisted of phonographs of various forms and sizes, as well as Edison-La Lande battery cells. The Edison phonograph is so well known that it needs no description here. While instruments of this class were judged by the jury of class 26, the awards were later transferred to class 15, Group III, by the action of the superior jury. The types shown comprised four sizes of spring-motor phonographs and three operated by electric motor. A great variety of records, horns, stands, and carrying cases were also shown. One of the most interesting features of the exhibit was a collection of early experimental machines produced by Mr. Edison before the present commercial form was evolved. Among these was the tin-foil machine which was built at Menlo Park in 1877. The Bloomfield machine, which was made in 1887, was also shown. This was provided with a wax cylinder, which was found to give far more practical results than the tin foil formerly employed. This instrument was equipped with what is known as a "spectacle attachment," to accommodate two diaphragms, one to record and the other to reproduce. Other steps in the evolution of the commercial instrument were illustrated, among them being the model that Mr. Edison personally carried and exhibited at the Paris Exposition of 1889. The Edison-La Lande battery, which was shown in nine different types and sizes, is well known to the electrical public.

Rowland Telegraphic Company, Baltimore, Md.—This remarkable exhibit created

widespread interest among telegraph engineers from all over the world, besides proving exceptionally attractive to the general public. It consisted of a system of multiplex printing telegraphy in operation, the company occupying two separate exhibit spaces, each of which comprised one end of the transmission line. The apparatus shown was capable of transmitting eight messages simultaneously over one wire, four in each direction, each message being printed on the telegraph form directly by the apparatus and without any handling or attention whatever by the receiving operator. The transmission apparatus consisted of a bank of keys, similar to those used on a typewriter, by which the sending operator could control the paper at the receiving end and print messages in all respects as easily as if he had been operating a common typewriting machine. With this apparatus it is possible to so control the printing at the receiving end as to be able to paragraph or tabulate in any manner desired. Four printers and four transmitters were shown in each space, and the line was operated daily during the Exposition. A technical description of this system of telegraphy will be found in the report of the United States juror for class 26. The Rowland instruments were considered by all the most radical improvement in telegraphic transmission shown at the Exposition.

John A. Roebling Sons Company, Trenton, N. J.—The feature of the exhibit of electrical conductors of this company was a short section of conduit electric railway, showing the application of electric cables to street railways and the method of installing them. This section of road was mounted high enough to admit of the construction at one side of two complete manholes. In each of these was shown a full set of lead-covered feeder cables of 1,000,000 circular mills. The racking and splicing were shown as carried out in ordinary American practice. Over one of the manholes a reel of cable was mounted, one end of which passed down into the manhole and from there into the conduit. In the other manhole this cable was seen projecting out of the conduit with its lacing of iron wire, which, with a pair of hooks and swivel, attached a heavy rope to the cable. The rope passes through a "pulling-in" frame to a windlass mounted above, and it is in this manner that the cable is pulled into the conduit. Feeder taps are run from the main feeder cable in the manhole to the contact rails of the railway, thus supplying the current operating the car. These rails are bonded with the Columbia rail bond, manufactured by this company. There were exhibited in show cases a large variety of telephone, telegraph, and power cables. In the rear of the exhibit was built a pyramid of the regulation Roebling reels, filled with various styles of cable and wire, while on the panel board, at the back of the space, were shown telegraph and telephone terminal heads and pot heads, Columbia bond, and a variety of the smaller sizes of insulated wire.

Western Electric Company, Chicago, Ill.—This firm made the largest exhibit of electrical apparatus at various times that was shown in the United States section. The most interesting portion of the exhibit was the installation of a complete central-station equipment for the central-battery telephone system, showing a board and accessories for 18,000 subscribers. Telephones installed in the various exhibit sections of this department connected through this board with all the exchanges of Paris, and a private line communicated with other telephones at the United States machinery building at Vincennes. This system, which is remarkable for its economy and efficiency of service, is rapidly becoming the standard for telephone practice. A complete description in detail of the advantages of this method of operating a central exchange will be found in the report of the United States juror, class 26. In addition, the company exhibited a great variety of standard American telegraph instruments, such as are used in the United States. Besides these there was shown a large motor generator, furnishing current for lighting and operating the various forms of apparatus in the exhibit, and a great variety of telephone instruments, designed and manufactured for the different European systems of telephony, arc lamps, switches, fuse blocks, cut-outs, and accessories of all kinds used in electric installations.

CLASS 27.—*Various applications for electricity.*

Gold Car Heater Company, New York City.—The exhibit of this company consisted of its improved electric heaters, which are adapted for heating street-railway cars, buildings, steamships, etc. The resistance were employed is a feature of this heater. It is composed largely of nickel and copper, and combines a high resistance with non-corrosive qualities. The supporting rods for the coil are of a novel construction. They were made in a form to hold the resistance wire firmly, so that there is no vibration, and at the same time do not occupy a sufficient amount of space to impede the circulation of air through the heater. The regulation of the temperature is provided for by dividing the coils within the heater into two separate groups. By turning the switch which regulates the amount of heat required to the first point, one-third of the capacity of every heater in the car or apartment is put in use. When the switch is turned to point No. 2 the first series is thrown out of circuit, but the remaining two-thirds of the capacity of all the heaters is in service, and on the third point of the switch both the first and second series are thrown together, utilizing the full capacity of every heater in the series.

The report of Mr. James S. Anthony, assistant director of machinery and electricity, is herewith appended.

FRANCIS E. DRAKE,
Director of Machinery and Electricity.

RETROSPECTIVE EXHIBIT.

SIR: I have the honor to submit the following short account of the work of selecting, preparing, and installing the retrospective exhibit of the department of machinery and electricity, together with a brief description of the same and a catalogue of its various items:

Your assistant director, on January 20, 1899, was placed in charge of the work of preparing a retrospective exhibit which should show the development of the mechanical and electrical arts in the United States. Headquarters having been provided in the Commission's offices at 120 Broadway, in New York City, work was immediately begun, in the nature of correspondence, personal interviews, etc., and later in the examination of apparatus, which resulted in the final selection of an exhibit of upward of 500 different objects, including a representation in all of the nine classes of the two groups under the direction of the department.

COLLECTION OF EXHIBIT.

The collection of this exhibit made necessary the personal examination of the material in the United States National Museum, the United States Patent Office, and the museums of many of our best-known technical schools, as well as in the storehouses of large manufacturing companies and the shops and homes of private individuals. The apparatus, models, records, and photographs shown were in nearly all cases loaned to the department and chosen from the sources thus indicated. The department itself undertook the preparation of a series of photographs of the early experimental apparatus of Joseph Henry, owned by Princeton University, and of views of the Speedwell Iron Works, at Morristown, N. J., where the early experimental work of Morse and Vail was carried on. A number of models were made and other exhibits prepared especially for this collection, and the great majority of the items were here first shown to the European public.

The work of collecting the specimens for this exhibit was not accomplished without considerable difficulty. Little trouble, it must be said, was experienced in inducing the manufacturing companies and private collectors to loan apparatus for this purpose, and it was largely due to the generous spirit of some of our largest firms that the exhibit was so complete; but in the cases of the museums and the United States Government departments some opposition was encountered.

DIFFICULTIES.

The law of July 1, 1898, creating the United States Commission, had provided in a general way for the release of exhibits belonging to the United States, so that they might be transported to and from Paris and shown at the Exposition of 1900. Many of the items chosen for the retrospective exhibit were models owned by the United States Patent Office, or historical apparatus shown in the United States National Museum. Of these latter a very inconsiderable number were owned by the Museum, the remainder having been deposited by various individual owners for exhibition purposes. In order to secure the release of these items it was necessary to present a written order from the owners to the secretary of the Smithsonian Institution, who is the official head of the Museum. This the department succeeded in accomplishing after a long correspondence and in some cases after personal interviews with the individuals concerned.

In regard to the patent models selected, the Commissioner of Patents referred the question of legal right to allow these models to leave the country to the Assistant Attorney-General attached to the Department of the Interior. The opinion rendered by the latter official early in January, 1900, was positively adverse to allowing the models to leave the country under the existing law. Accordingly, with the consent of the Secretary of the Interior and the Commissioner of Patents, a clause was added to the urgency deficiency bill, which had then reached the Senate committee, authorizing the Commissioner of Patents to release these models, in charge of a custodian from his office, for the purpose of exhibition in Paris, and they were prepared for shipment in the Patent Office and shipped from Washington on the 24th of February, 1900.

INSTALLATION.

The difficulties and delays in the installation of this exhibit, with the attendant increase in the expense, have been fully dealt with by the director of machinery and electricity in his report on the work of the department. It is only necessary to add here that it was with the greatest difficulty that many pieces of apparatus were kept from being injured by water and dirt. In several instances it was judged best by your assistant director to repack apparatus already unpacked and installed to prevent injury.

The installation of this section in the palace of electricity was undertaken on a scale commensurate with the importance and interest of the items shown. The space allotted by the French Administration was, approximately, 100 by 50 feet, with two small ell's or additions projecting from either end. (See plan.) Through this space passed two aisles, each 13 feet wide, laid out by the French architects, thus leaving for exhibit purposes a central portion, approximately 50 feet square,

and two long side rooms. This central portion was again subdivided into a circular room or rotunda and four rooms leading from it and occupying the corners of the space. The division of rooms and aisles was effected by a colonnade in staff with a cornice of the same material, surmounted by elaborate ornamentation and lighted by upwards of 500 incandescent lamps, which were shaded by prismatic glass globes. All the lighter exhibits were installed in waxed oak cases with plate-glass sides and shelves, while the heavy pieces which did not rest on a platform constructed for them were placed on heavy oak tables especially designed for the purpose.

The exhibit space in the interior of the façade was carpeted in red, while the walls in the long side rooms were tastefully hung with a sage-green fabric. The show cases were lined with material of the same color as the carpet, and between the columns on the base of the façade were placed potted palms, the whole presenting a remarkably pleasing appearance from many advantageous points of view.

The architect of the façade was Mr. Clarence Luce, of New York, whose design was chosen from among several submitted, and the work of construction, with subsequent details of carpets, wall hangings, and plants, was all performed under the superintendence of Mr. John Getz, chief of decorations.

DESCRIPTION OF EXHIBITS.

The representations of the classes in Group IV—19 to 22, inclusive—were almost exclusively from the United States Patent Office, and consisted of models owned by the office. They included steam engines, valve gears, injectors, gas and hot-air engines, water wheels, and all classes of machine tools and automatic machines for working in metal and wood. This section also included a number of models of primitive lathes, planers, etc., which had been prepared by the Patent Office for previous exhibitions in the United States. All the models in the foregoing classes were installed in one of the long side rooms of the section, in eight show cases, arranged as indicated in the plan of installation.

The classes in Group V—23 to 27, inclusive—were very completely covered, the apparatus displayed filling three-quarters of the entire space. This was made possible by the fact that electrical science is of such comparatively recent development that the actual apparatuses used by famous inventors, investigators, and experimenters are, in most cases, still in existence, and were found available for such an exhibit as this. On the other hand, however, the mechanical arts set forth in Group V have been of such gradual growth, extending over a long period of time, that the existing Patent Office models form the most complete record available, although a somewhat unsatisfactory one. Again, the electrical inventions of the seventies in the United States were of such novel and sensational character, and were followed so rapidly by



D-13. INTERIOR OF FACADE AND SALON D'HONNEUR, DEPARTMENT OF MACHINERY AND ELECTRICITY, FIRST FLOOR,
CHAMP DE MARS.

improvements and commercial modifications, that the original apparatus was often guarded as a curiosity, where it did not serve the more serious purpose of proving priority of invention.

It was thus found that many models and appliances of great interest were owned by museums or by inventors themselves, and, above all, by the great electrical companies. In describing briefly the chief items of the exhibit the names of the owners are mentioned, while a complete list of those contributing, including the items presented, is appended to this report.

Class 23, machines for generating and using electricity, included many of the most interesting items shown. In generating apparatus were exhibited the original Brush dynamo for arc lighting; a first type Thomson arc machine; first type Edison bi-polar generator, one of the four installed on board the steamship *Columbia*, which was the first steamship to be lighted by electricity from its own plant; Seely dynamo, owned by the American Institute of Electrical Engineers, and built for Horace Greeley as a curiosity, and a large number of primitive generators and motors from the earliest times. Of special interest, from their associations, were two small motors, the first to be run from a current generated by the great Niagara Falls power plant and transmitted 500 miles over the wires of the Western Union Telegraph Company.

In electric traction the representation was very complete. The American Institute of Electrical Engineers kindly loaned their most valuable piece of apparatus, the Davenport electric car, built and operated in 1834 by Thomas Davenport, a Vermont blacksmith, and probably the earliest example of electric traction known. Photographs and drawings were shown of the electric car of Moses G. Farmer, operated in 1847, but the original was not obtainable. The Edison Menlo Park locomotive of 1880 and the car of S. H. Short of 1885 were both shown, as well as a very complete series of five railway motors of dates from 1888 up to the present time, illustrating the gradual evolution of the electric traction motor in America. These motors, the products of various inventors, were all loaned by the General Electric Company, of New York. In addition to the apparatus shown was a collection of photographs prepared by Prof. S. H. Short, illustrating the growth and development of street-railway operations in the United States.

Properly belonging in this class, though far removed by time from the other exhibits, were two facsimile models of frictional electric machines, one made by Benjamin Franklin and the other used by him. These were made with great care by the students of the Spring Garden Institute, of Philadelphia, from the originals in the Franklin Institute, of that city, especially for this exhibit, and attracted much attention.

Class 24, electro-chemistry, included cells of primary batteries used

for electric lighting in 1854, of interest as historical relics. A very large cell of a Bunsen battery with a carbon element weighing over 80 pounds, which was sawed out of natural gas furnace carbon, was one of the most striking items shown. This cell was one of a number constructed by Prof. R. Ogden Doremus, of New York, in 1854. Brush's early plating dynamo and various examples of early electro-plating were also shown.

Class 25, electric lighting, occupied one entire room and a large case in an adjoining room. This class was unusually rich in interesting items. In arc lighting the first lamp of Charles F. Brush, with its attendant generator, mentioned in class 23, was shown, together with the first Jandus inclosed arc lamp and early lamps of Thomson, Maxim, and others. The nonautomatic lamp of Professor Doremus, dating from 1854, with its large parabolic reflector, which was so successfully operated by primary batteries that a daguerreotype was taken by its light, was one of the chief items. Various forms of experimental search-lights and current controllers and Brush shifting mechanisms peculiar to arc lighting were also shown. In incandescent lighting were included several forms of early lamps of Farmer and Edison, the first chandelier wire used for incandescent lamps at Mr. Edison's laboratory, and a large collection of sockets, switches, and accessories used in the construction work. Besides these, a unique exhibit was a sample case used by agents from the Edison Central station in 1882 to solicit orders for putting in electric lights, which at that time were so novel as to need explanation.

Class 26, telegraphy and telephony, included a series of nineteen models, with explanatory diagrams illustrating the progress of the telephone from 1876 to the present day. These models were made with the greatest care by the American Bell Telephone Company and loaned to the department. They were in all cases facsimiles of the original apparatus, and only such as marked important steps in the development of the instruments were selected for reproduction. This series represented the work of Bell, Berliner, and Edison, and constituted one of the most valuable and instructive groups in the exhibit.

The telegraph collection included models of Morse's first instruments, complete, together with later forms of keys and recorders; also duplex and quadruplex telegraphs of Edison and Farmer. Among the modern instruments which were of interest on account of their association were those used in transmitting the message around the world at the Electrical Exposition of New York in 1896. These were loaned by Mr. F. W. Hawley, of New York. Various forms of printing telegraphs and Professor Gray's telautograph apparatus completed this section.

In class 27, various applications of electricity, one entire case was devoted to measuring instruments, which included the original amme-

ter and voltmeter made and used by Charles F. Brush (consisting of a pair of solenoids pulling on cores attached to a spring scale); Farmer's original tangent galvanometer, Farmer's Wheatstone bridge and resistance, and the early forms of Thomson's ammeters, voltmeters, and wattmeters, which are now in such universal use.

Electric welding was represented by an original dynamo and welder combined, made by Elihu Thomson; a model welder from the Patent Office, and a large number of experimental and commercial samples of work, the latter being kindly supplied by the Standard Welding Company, of Cleveland, Ohio. Not the least interesting of the items in this class was the thermo-electric battery of Moses G. Farmer, which was first shown at the Paris Exposition of 1867.

Besides the exhibits strictly classifiable as above were a large number of photographs, old advertisements, handbills, and personal relics of inventors, of historical interest. Nor should the reviewer forget the very complete exhibit of the system of accounts and record keeping employed by the Chicago Edison Company, of Chicago, Ill., a system which has been largely followed by all the large lighting and power companies in the United States. This exhibit was prepared and arranged by Mr. Walter M. Anthony, comptroller of the company.

Altogether, the retrospective exhibit was a decided success as a whole, as well as in each of its parts. During the entire Exposition it was visited by engineers and scientific men from all countries, and all evidenced much interest in the collection and recorded pronounced approval of it.

SPECIMENS CONSTITUTING RETROSPECTIVE EXHIBIT.

Below will be found a list of all apparatus, models, and other items of the retrospective exhibit, together with the names of the individuals, establishments, or institutions contributing them:

ELECTRICAL.

Davenport electric motor and Seely dynamo, contributed by the American Institute of Electrical Engineers, New York City.

Bell figure 5 telephone; Bell telephone of 1875; Bell single-pole membrane telephone; Bell double-pole membrane telephone; Bell iron box magnetic receiving telephone, used at the Centennial Exposition in 1876; Bell figure 7 transmitter; Bell figure 7 receiver; Bell centennial liquid transmitter; Bell telephone receiver; improved commercial form of Bell long-distance receiver; Bell box telephone; Bell box telephone, style 7; Blake transmitter, experimental form; Blake transmitter, present form; granular button transmitter, present form long-distance transmitter; battery speaking tube set for hotels; battery speaking tube set for offices; sample of first hard drawn copper wire for telephones; marine set, No. 4, for use between decks; descriptive diagrams and photographs, contributed by the American Bell Telephone Company, Boston, Mass.

Early experimental ammeter and early experimental voltmeter, contributed by Charles F. Brush, Cleveland, Ohio.

Gas carbon electrode, weighing 83 pounds; porous jar and zinc element for quantity battery, 1854; gas carbon electrode; large parabolic reflector for arc light, 1854; glass ellipsoid arc light; apparatus to exhibit electric light between electrodes of gas carbon; Bunsen battery cell, 1854, contributed by Prof. R. Ogden Doremus, New York City.

Apparatus designed by Prof. Moses G. Farmer, resistance coil, early form of rheostat, keyboard for firing torpedoes, keyboard for firing torpedoes with bell, testing instruments, electro-magnet engine, reversible electric motor, model of copper plated bolt, adjustable carbon rheostat, slide apparatus for measuring low resistances, Wheatstone bridge, astatic galvanometer, nonadjustable condenser, adjustable condenser, repeater for ocean telegraphy, paper perforated for cable telegraphy, keyboard for printing telegraphy, electric boiler, lamp holder and cut out, original incandescent lamp, windmill storage-battery plant, duplex telegraph key, experimental cable key, arc lamp regulator, regulator for arc lamp cut out for electric lighting, experimental dynamo, reversible electric motor, armature frame, made in 1868; photograph of electric car, framed portraits of Professor Farmer, personal relics, handbills, advertising matter, contributed by Miss Sarah J. Farmer, Eliot, Me.

Early Thomson ammeter, Thomson inclined coil ammeter, Thomson recording wattmeter, first Brush arc dynamo, early Thomson arc machine, arc regulator for shifting brushes, Thomson-Houston arc regulator, three-part arc commutator, reactance coil, arc circuits, distributor for incandescent lamps, early Brush arc lamp, arc lamp mechanism, magnetic system of arc lamp, Thomson-Rice arc lamp, searchlight, Gramme ring armature, Van de Poêle railway motor, Thomson bipolar alternator, carbon Brush holders, specimen of commutator, early snap switch, early specimen of quick-break switch, another specimen of quick-break switch, fuse box of wood; Thomson electric welding machine, Thomson electric welding machine, dimmer for alternating current circuits, insulation for trolley line, insulation for trolley line, conical trolley support, Thomson-Houston railway motor, single reduction gear motor, box type railway motor, type J controller, type E controller, type 51 rheostat, old Z type Edison bipolar railway motor Observatory Hill, potential regulator, Brush plating machine, contributed by the General Electric Company of New York City.

Three Morse telegraph instruments used in transmitting message around the world in 1896, Lundell electric motor operated by first current from Niagara Falls power plant, contributed by Frank J. Hawley, New York City.

Edison's Menlo Park electric locomotive, 7 framed photographs and diagrams illustrating the operation of the same, contributed by W. J. Jencks, of New York City.

First inclosed arc lamp used on constant potential circuit and cross section of the same, contributed by William Jandus, of Cleveland, Ohio.

Collection of early specimens of advertising matter from Brush Company, Edison Company, and Thomson-Houston Company, contributed by A. S. Lepphard, Schenectady, N. Y.

Photographs of Brooks locomotive exhibited at Paris Exposition of 1869, contributed by A. J. Mundy, Boston, Mass.

Early form of Van de Poêle trolley, first circular issued by the Bell Telephone Company, first newspaper printed by electricity, contributed by T. C. Martin, New York City.

Electric car "Joseph Henry," collection of photographs illustrating the development of electric traction in America, contributed by S. H. Short, Cleveland, Ohio.

Model of Henry reciprocating electric motor, model of Henry rotary electric motor, model of Henry electro-magnetic signal, model of Henry "Yale" magnet, model of battery element with Henry "Yale" magnet, model of battery used with Henry electro-magnetic signal; G, M, O, Q, R, five framed photographs of Henry electric apparatus, framed portrait of Henry steel engraving, framed photograph of Henry statue, model of Page electric motor, model of Morse telegraph instrument, model

of Morse port rule, model of Morse register "Schieb," model of Morse telegraph key, framed portrait of Morse, contributed by the Smithsonian Institution, of Washington, D. C.

First chandelier wires for incandescent lighting, collection of early forms of sockets for incandescent lamps and switches for the same, agent's sample case used for soliciting orders for electric lighting in 1882, contributed by Luther Stieringer, of New York City.

Model of Franklin electrical machine, model of Franklin cylinder electrical machine, model of Oliver Evans high-speed engine, contributed by Spring Garden Institute, of Philadelphia, Pa.

Commercial specimens of electrically welded steel, contributed by Standard Welding Company, Cleveland.

CONTRIBUTED BY THE UNITED STATES PATENT OFFICE, WASHINGTON, D. C.

Electric lamp, electric-light regulator, magneto-electric machine, commutators for magneto-electric machine (by C. F. Brush), electric lamp, dynamo-electric motor, commutators for electro-magnetic machine, dynamo-electric machine (by H. C. Maxim), electric-light regulator (by N. S. Keith), electric arc lamp (by B. B. Ward), electric lamp, electric motor (by Van Depoele, C. J.), regulator for electric lamps, current regulator for dynamo-electric machines (Thomson-Houston), magnetic motor (Joseph Henry), electric engine (by M. H. Jacobi), electric light (by Day, M.), electric-signal light (by Gardiner & Blossom), electric-lighting apparatus, electro-magnetic engine (by A. P. Berlioz), electric lamp (by William Wallace), magnetic electric machine, printing telegraph, and magneto-electric machine (by T. A. Edison), propelling machinery by magnetism and electro-magnets (T. Davenport), quadruplex telegraph (by Muirhead & Winter), printing, telautograph (by Elisha Gray), printing telegraph (by Samuel Essick), magnetic electric machine (by Lontin & Ivernois), dynamo-electric machine, magneto-electric machine, dynamo-electric machines (by Edward Weston), dynamo-electric machine (by W. Hochhausen), electro-magnetic engine, duplex telegraph (by M. G. Farmer), dynamo-electric machine, dynamo-electric machine, dynamo-electric machine, electric welding plant (by E. Thomson), electric motor (by Walter E. Hyer), magneto machine (by Pixii), electro-magnetic engine (by J. H. Lillie), magneto-electric machine (by James J. Wood), electric motor (by Orazio Lugo), electric motor (by R. Eickmeyer), electric magnetic motor (by W. W. Griscom), electric motor (by Philip Diehl), electric motor (by Emil Meyrowitz), electric motor (by E. J. Houston), mode of changing the poles of electric motors (by N. Walky), electro-magnetic engine (by Charles G. Page), electric magnetic engine (by H. M. Paine), electric magnetic engine (by S. Stimpson), electric magnetic engine (by J. Bishop), specimens of electric welding, specimens of wood screws, autograph telegraph (by Jos. J. Robertson), locomotive engine (by Ross Winans), steam engine (by S. H. Whitmore), cut-off (by F. B. Stevens), duplex eccentric valve motion (J. J. G. Collins), variable cut-off gear for steam engines (by D. A. Woodbury), trunk engine (by T. Northy), oscillating engine (A. B. Latta), direct-acting engine (R. Crewsbaur), double-acting steam pump (by Chas. Rogers), marine steam engine (by Maudsley & Field), oscillating engine (G. F. Wood), compound locomotive (by S. M. Vaulclain), rotary engine (J. Platt), cut-off and gear for steam engines, governor for steam engines (by J. Knowlson), lifting, tripping, and regulating the closing of steam valves (by F. E. Sickles), steam engines (G. H. Reynolds), oscillating steam engine (Pattison, J.), steam engine and pump (by J. G. Baker), hot-air engine (by Soderstrom, L. A. L.), hot-air engine, air engine, steam engine (Ericsson, John), engine operated by the explosion of inflammable gas (by Stewart Perry), gas engine (by F. W. Gilles), gas engine (by N. A. Otto), compound engine (Archbold, S.), rotary engine (Lamb, G. A.), adjustable cut-off gearing for puppet-valve engines (by Allen & Wells), valve gear for steam engines (by A. Hartupee), locomotive for ascending

and descending inclined planes (by E. Coleman), direct-acting compound engine (W. M. Henderson), engine for twin screw propeller (by G. B. Whiting), rotary engine (by J. H. Hathaway), steam engine (by N. E. Nash), rotary engine (by A. Bailey), steam engine (W. Huston), steam engines (by E. Danford), compound engine (Albion Vile), steam injector (Samuel Rue), injector (by A. S. Eberman), injector (by T. J. Hart), injector (by W. E. Dodge), injector (A. Friedmann), injector (by L. Kaczander and R. Ruddy), injector (by Wm. Sellers), injector (by S. L. Kneass), injector (by J. Desmond), injector (by W. T. Messinger), injector (by C. E. Church), injector (by W. J. Sherriff), injector (W. B. Mack), injector (Millholland, J.), injector (H. Gifford), inspirator (T. J. Hancock), steam-actuated valve (steam pump, by R. L. Frost, Union Manufacturing Company), pumping engine (by H. R. Worthington), locomotive engine (A. M. Cumming), machine for turning corks for bottles (by James Barron), machine for sawing heading, staves, and spokes (by J. G. Wilson), blind seat-planing machine (C. P. S. Wardwell), machine for making spool blanks (by Johnson & Bruns), grooving machine (by D. D. Hanson), wood-planing machine (by Thoes E. Daniels), machine for boring brush blocks (C. A. Mahle), mortising machine (by Grover & Parmelee), carving machine (by S. D. Sizer), wood-planing machine (by G. Rinewalt), box-nailing machine (by Knauss & Grammes), boring machine (by T. G. Morse), box-nailing machine (by H. Messer), primitive India lathe machine for boring posts (by James Corbett), screw-cutting machine (by W. N. Adams), screw tap (by M. C. Johnson), screw plate (Van Dorn, T. L.), taps and dies (by James Flower), stock and dies for screw-threading pipe (by H. O. Choles), screw-cutting die stocks (by T. H. Rose), screw tap (G. H. Fox), screw tap (W. Mantey), screw tap (Rider & Wiggins), plate for holding screw-cutting dies (by J. G. Geiser), machine for threading and cutting off pipe (by L. W. Stockwell), feed roller for wood planers (by B. D. Whitney), box-nailing machine (by W. H. Brock), wood planer (by D. N. Smith), machine for forging horseshoe nails (by R. Ross), wire-nail machine (by J. E. Kimball), weldless-chain machine (Jacker, M.), metal-screw machine (by Roper & Roper), machine for cutting threads on wire (E. F. Richardson), lathe for turning irregular forms, turning and screw-cutting lathe, old style; spring pole lathe, old style (by Thos. Blanchard); machine for dressing the heads and pointing and threading the shanks of bolts (by W. E. Ward), horseshoe machine (by Claud & Ball), machine for pointing and finishing horseshoe nails (by S. S. Putnam), machines for impressing, embossing, compressing, and shaping metals, horseshoe machine (by J. T. Walker), machine for making pump chains (by John Adt), machine for making horseshoe nails (G. J. Capewell), machine for making shoe-tack wire (by L. Goddu), horseshoe machine (by H. Burden), machine for making horseshoe nails (by S. S. Putnam and L. H. Dwelley), machine for punching horseshoes, horseshoe machine (by G. C. Pyle), machine for making chains (by Elijah Shaw), machine for making sheet-metal chains (Egge, Fred.), machine for making spikes (S. A. Standiford), nailing forging machine (by D. Armstrong), machine for forging horseshoe nails blanks (by Wysall & Merrick), machine for making horseshoes (by C. Browning), machine for forging horseshoe nails (by J. A. Hutchinson), tack machine (by Chess, H. B.), file-cutting machine (by Alfred Weed), gear-cutting machine (by John A. Peer), gear-cutting machine (by Chas. E. Albro), machine for turning beveled gear (by Smith & Course), gear cutter (by H. Bilgram), machine for turning round tenons (by G. W. Foskett), machine for making spools (by A. D. Waymouth), file-cutting machine (by J. E. Crisp), file-cutting machine (by Jas. Jervis), metal-screw machine (by Chas. D. Rogers), wood-screw machine (E. E. Quimby), metal-screw machine (A. Johnston), metal-screw machine (Edward Croft), machine for nutting bolts (by S. L. Worsely), machine for threading screw blanks (A. Johnston), shaving, nicking, and pointing screw blanks (by B. A. Mason), machine for threading bolts (by J. B. Wiggenhorn), machine for making machine screws (by W. H. Eddy),

metal-screw machine (L. W. Stockwell), metal-screw machine (by Reynolds and English), machine for turning and nucking the heads of screws (by Ira Griggs), machine for rolling threads on screws (E. Croft), metals screw machine (A. W. Gifford), machine for threading wood-screw blanks (by Nugent & Tilton), machine for threading screw blanks (by E. Croft), machine for threading screw blanks (by H. H. Taylor), machine for threading screw blanks (by Geo. Emig), machine for threading screw blanks (by J. S. Schuyler), machine for finishing horseshoe nails (by S. S. Putnam), machine for twisting spikes (by S. H. Wilson).

Yours, very truly,

JAMES S. ANTHONY,

Assistant Director of Machines and Electricity.

MR. FRANCIS E. DRAKE,

*Director of the Department of
Machinery and Electricity.*

REPORT OF THE DEPARTMENT OF TRANSPORTATION
AND CIVIL ENGINEERING,
GROUP VI,
AND
ARMY AND NAVY,
GROUP XVIII.

WILLARD A. SMITH, DIRECTOR.

DEPARTMENT STAFF:

LIEUT. COMMANDER ASHER CARTER BAKER, U.S. N., Assistant Director.
GEO. S. WILKINS, C. E., Expert in Charge of Engineering Exhibit.
JOHN R. BUCHAN, in Charge of Yachting Exhibit.
PERCY HUDSON, Superintendent.
CARL LORENTZEN, in Charge of Collective Engineering Exhibit.
LIEUT. H. C. POUNDSTONE, U. S. N., in Charge of Army and Navy Exhibit, Group XVIII

DEPARTMENT OF TRANSPORTATION AND CIVIL ENGINEERING.

CONTENTS.

Department staff—Classification—Catalogue of exhibits—Key to illustrations—Director's narrative—Key to installation—Description of exhibits—Mississippi River improvements—Steel construction of buildings—Railroad and other transportation exhibits at Bois de Vincennes.

Army and Navy exhibits.—Key to illustrations—List of exhibits and exhibitors—Description of exhibits.

CLASSIFICATION.

GROUP VI.—CIVIL ENGINEERING—TRANSPORTATION.

CLASS 28.—*Materials, equipment, and process relating to civil engineering.*

Building materials (other than timber, materials extracted from quarries, metals, and ceramic products): Lime, cement, plaster, artificial stone, etc. Equipment and methods of production of these materials. Methods of testing building materials. Preparation of building materials: Implements and methods used by stonecutters, masons, carpenters, slaters, joiners, locksmiths, plumbers, glaziers, painters, etc. Equipment for and methods used in earthwork: Hand tools, excavators, scrapers, barrows, dump carts, service tracks, handcarts, trucks, etc. Equipment for and methods (other than pumps) for preparing foundations: Piles, pile drivers, screw piles, pneumatic apparatus, etc. Equipment for and methods of transporting and distributing material. Equipment for and methods for the maintenance of roads, streets, public promenades, etc. Equipment for lighting seacoasts and beacons. Equipment for and methods used in distributing water and gas (not including gas meters). Equipment for and methods used in pneumatic telegraphy.

CLASS 29.—*Models, plans, and designs for public works.*

Roads and other public highways on land. Bridges and viaducts. Inland navigation: Improvement of rivers, construction of canals, dams, locks, lifts, fixed bridges or drawbridges, canal bridges, reservoirs and feeders, pumping stations, mechanical towing and warping; equipment used for the development of river ports. Seaports: General arrangements, jetties, basins, locks, swing bridges; equipment for development (not including shipping). Maritime canals. Provision of lights and beacons for seacoasts. Protection against flooding by rivers or by sea. Railways, as regards plan and profile of the line, and engineering works. Construction and maintenance of streets in cities. Water supply, sanitation, and gas lighting of cities. System of telegraphy by compressed air. Statistics, maps, and publications relative to public works. Construction of the International Exposition of 1900.

CLASS 30.—*Carriages and wheelwright's work—Automobiles and cycles.*

Pleasure carriages, sleighs, sedan chairs. Public carriages, ambulances, carriages for invalids and infants. Carts for all purposes; trucks and drays. Vehicles driven by mechanical motors. Motorcycles. Bicycles. Velocipedes. Detached parts, materials and inventions pertaining to carriage building, wheelwright's work, automobiles, or cycles.

CLASS 31.—*Saddlery and harness.*

Equipment for horses or other animals, attached to carriages, mounted, or in the stable. Harnesses for pleasure carriages, saddles, bridles; harness for public service or for draft. Parts of harness, materials, and inventions pertaining to saddlery and harness making.

CLASS 32.—*Equipment for railways and street railways.*

1. Railways of standard or narrow gauge. Permanent way: Grading, ballast, etc.; ties, rails, chairs, fish plates, and other parts of the track; switches and crossings; stations; transfer tables, turntables, and bridges; weighing apparatus, gauges, and accessories; fixed signals, systems, and apparatus for securing the safety of traffic; water supply; snow sheds and fences; track repairer's tools. Rolling stock: Locomotives, tenders; passenger coaches; freight cars, separate parts of above; automatic brakes; train signaling apparatus; engine houses; shops for construction and repairs; snow plows; apparatus for taking various observations; dynamometers, self-registering apparatus; laboratories. Management: Time-tables; distribution of rolling stock; cleaning and disinfection; signaling of trainmen and various systems for assuring the safety of traffic; passenger department; tickets, ticket cases, posters, tariffs; freight department; methods and equipment for checking and handling baggage and freight. 2. Other railway systems. Rack, cable, elevated, sliding railways; movable platforms. Permanent way: Motive power or motors; rolling stock. 3. Street railways. Various types of tracks upon different kinds of roads; switches and crossings; turntables; wyes and loops for turning; implements for track laying, cleaning, etc. Cars drawn by animals: Locomotives and automobile vehicles; rolling stock for street railways operated by mechanical traction; braking appliances; equipment for using stored power (hot water, compressed air, electricity, etc.). 4. Special methods of transportation, similar to railways. Transport of ships over railways. 5. Bibliography. Statistics, special maps, and various publications relative to railways.

CLASS 33.—*Material and equipment used in the mercantile marine.*

1. Raw material and material specially used in the construction and fitting out of ships and boats. 2. Special tools and implements used in shipbuilding yards and in marine-engine works. 3. Drawings and models of all kinds of vessels or boats for navigating seas or rivers. Illustrations showing the arrangement of such vessels or boats. Launches and small craft propelled by machinery, by wind, or by oars. Drawings and models of tugs and towboats. Motive power for vessels and boats (drawings, models, and specimens): Boilers, water heaters, evaporators, recuperators, filters for feed water; engines, condensers, propellers; machinery, auxiliary to main engines, pumps, governors, indicators of speed and direction, engine counters, etc. Arrangements for the prevention of fires in holds, storerooms, and passages. Engines for loading and unloading merchandise. Equipment: Winches, tackle, chains, anchors, hawsers, cables, etc., steering apparatus, order transmitters, machinery for working sails, ships' lights and signals, fresh-water condensers, apparatus for lighting, heating, supplying air, and ventilation. Special apparatus for the generation and use of electricity, freezing apparatus, special instruments for determining position and time, flags and signals, furniture, etc. Pleasure craft: Yachts and steam

or sail boats, rowboats, outriggers, skiffs, etc., and their accessories (drawings, models, and specimens). Submarine navigation. Equipment for the saving of lives and vessels at sea, boats, line, carriers, lines, traversers, safety belts and jackets, etc. Humane societies. Spreading of oil upon the sea. Equipment for raising wreckage, and for submarine operations for saving sunken material. Swimming. Statistics, special charts and publications relative to navigation for commerce or for pleasure.

CLASS 34.—*Aerial navigation.*

Balloon construction: Fabrics, varnishes, cars, valves; netting, cordage; appliances for stopping balloons, anchors, grapnels. Generation of hydrogen and of other light gases. Captive balloons. Aerial voyages. Use of balloons for the study of the atmosphere; air currents, clouds, temperature at great heights; optical phenomena, etc. Drawings, maps of journeys, diagrams, photographs. Military ballooning; military captive balloons and their accessories; winding drums, transport wagons; apparatus for inflation. Aerial navigation. Dirigible balloons and guiding apparatus. Flying machines; screw propellers; aeroplanes and parachutes.

GROUP XVIII.—MILITARY AND NAVAL.

CLASS 116.—*Ordnance and equipment for artillery.*¹

Equipment and methods used in arsenals and manufactories of war material. Land service, ordnance and projectiles. Sea service, ordnance and projectiles. Firearms. Ammunition and explosives. Gunpowders. Powder mills. Side arms. Artillery equipment and gun carriages for armies. Artillery equipment and gun carriages for navies.

CLASS 117.—*Military engineering and accessories.*

Engineering equipment. Construction of railways. Projects for laying out and constructing railways in the colonies. Barracks in France and in the colonies. Electricity and its applications. Military ballooning. Telegraphs and telephones. Bridges.

CLASS 118.—*Naval construction—Hydraulics—Torpedoes.*

Ships of war: Hulls and accessories, engines and boilers, auxiliary machinery, armament. Equipment and products of arsenals. Applications of electricity. Hydraulic works. Torpedoes, offensive or defensive. Naval schools. Drawings. Photography. Life-saving service.

CLASS 119.—*Cartography, hydrography, various instruments.*

Topographic department of the army: Geodesy, topography, maps and drawings, optical and mathematical instruments, photographic apparatus, military bibliography. Hydrographic department of the navy: Charts, scientific instruments, instruments of navigation, naval bibliography.

CLASS 120.—*Administrative departments.*

Clothing, equipment, berthing, camping, and hutting of soldiers, sailors, marines. Apparatus and tools used in administrative service. Commissariat: Field bakeries, preserved foods, equipment for preserving goods. Musical instruments. Farriery, harness. Sea fisheries.

¹ The nomenclature of this group has been adopted with a view exclusively to the arrangement of exhibits. Many of the articles named will be referred to their proper classes when the juries make their examination for awards.

CLASS 121.—*Hygienic and sanitary equipment.*

Sanitation of armies in peace and at war. Equipment and methods used for removing the wounded. Sanitation of navies; equipment and methods used in removing the wounded. Societies for giving aid to the wounded. Filters and other apparatus for purifying water.

CATALOGUE OF EXHIBITORS.

GROUP VI.—CIVIL ENGINEERING—TRANSPORTATION.

CLASS 28.—*Materials, equipment, and processes relating to civil engineering.*

American Car Sprinkler Company, Worcester, Mass.: Photographs of street-sprinkling machinery.

American Hoist and Derrick Company, St. Paul, Minn.: Photograph of hoisting machine.

American Pneumatic Service Company, Boston, Mass.: A system of pneumatic carriers for post and package delivery.

Barr, J. Carrol, Morgantown, W. Va.: Photographs of engineering work.

Bates, Lindon W., Chicago: Model of a hydraulic dredge.

Bradley Pulverizer Company, Boston, Mass.: Photographs of cement machinery.

Broadway Chambers, The, New York: A collective exhibit illustrating the materials and construction of an American steel office building in New York City. Contributors: Bradley & Currier Company, New York, interior woodwork; Brooklyn Electric Equipment Company, Brooklyn, N. Y., electric lighting; Bullock Electric Company, Cincinnati, Ohio, electric generators; Byrne, Thomas J., New York City, plumbing; Carnegie Steel Company, Pittsburg, Pa., steel frame; Clonbrock Steam Boiler Company, Brooklyn, N. Y., boilers and fittings; Empire City Marble Company, New York, marble; Fuller, George A., Company, New York City, builders' models; Gilbert, Charles, New York City and St. Paul, Minn., architect; Hecla Iron Works, Brooklyn, N. Y., iron supplies; Otis Elevator Company, New York City, elevators; Payne Engineering Company, New York, engines; Peirce, John, New York City, granite; Perth Amboy Terra Cotta Company, Perth Amboy, N. J., terra cotta; Pittsburg Terra Cotta Lumber Company, Pittsburg, Pa., fire-proofing; Purdy & Henderson, New York City, consulting engineers; Russel & Irwin Manufacturing Company, New York, hardware; Taylor, Henry, Lumber Company, Lafayette, Ind., lumber construction; Wells & Newton Company, New York City, steam heating.

Bueyrus Company, The, South Milwaukee, Wis.: Model of dredging machine, and photographs.

Buffalo Pitts Company, Buffalo, N. Y.: Photographs of civil-engineering machinery.

Case Manufacturing Company, Columbus, Ohio: Photographs of traveling cranes.

Cleveland Crane and Car Company, Cleveland, Ohio: Photographs of traveling cranes.

Clulow, P. T., Schenectady, N. Y.: Photographs of engineering machinery.

Davis, Charles Henry, New York: An album of photographs of engineering work.

Deering Harvester Company, Chicago: Working model of an American factory plant, showing the arrangements for handling the materials by trains of cars and vessels.

Diamond State Steel Company, Wilmington, Del.: Photographs illustrating construction of steel factory.

Edson Manufacturing Company, Boston, Mass.: Photographs of engineering machinery.

Flory, S., Manufacturing Company, Bangor, Me.: Photographs of carrying machinery.

Gillette-Herzog Manufacturing Company, Minneapolis, Minn.: Photographs of steel construction.

- Good Roads Machinery Company, Kennett Square, New York: Photographs of road machinery.
- Graves, Edwin D., Hartford, Conn.: Photographs of engineering work.
- Henny, D. C., San Francisco, Cal.: Photographs of irrigation work.
- Hill, George, New York: Photographs of fireproof warehouse construction.
- Hutton, William R., New York City: Photographs of engineering construction.
- Ingersoll-Sergeant Drill Company, 26 Cortlandt street, New York: Model drills, quarrying machinery, compressors, etc., used on the Chicago Drainage Canal.
- International Association for Testing Materials, Philadelphia, Pa.: Photographs of testing machinery, etc.
- Iroquois Iron Works, Buffalo, N. Y.: Photographs of civil-engineering machinery.
- Jeffrey Manufacturing Company, Columbus, Ohio: Photographs of conveying machinery.
- Lathbury & Spackman, Philadelphia, Pa.: Photographs of Portland cement manufacturing.
- Link Belt Engineering Company, Nicetown, Philadelphia, Pa.: Photographs of conveying machinery.
- Linton, Harvey, Altoona, Pa.: Photographs of engineering work.
- McKim, Alexander Rice, New York: Photographs of engineering construction.
- Marion Steam Shovel Company, Marion, Ohio: Photographs of dredging and excavating machinery.
- Mississippi River Commission, St. Louis, Mo.: Models of graders and dredges.
- Phosphoria Phosphate Company, Limited, St. Augustine, Fla.: Photographs of pebble phosphate plant.
- Rand Drill Company, 100 Broadway, New York: Rock drills and machinery used on the Chicago Drainage Canal.
- Reed, D. A., Duluth, Minn.: Photographs of engineering work.
- St. Bernard Coal Company, Earlington, Ky.: Photographs of mining and conveying machinery.
- Standard Paint Company, New York: Roofing materials.
- Steel Cable Engineering Company, New York City: Photographs of conveying machinery.
- Thackray, George E., Johnstown, Pa.: Photographs illustrating modern steel building construction.
- Trenton Iron Company, The, Chicago: Photographs illustrating the preparation of engineering materials, wire, wire rope, iron, etc.
- Wood, R. D., & Co., Philadelphia, Pa.: Photographs of bridge construction.

CLASS 29.—*Models, plans, and designs for public works.*

- Abbot, Frederic V., U. S. A., St. Paul, Minn.: Photographs from United States engineer office.
- American Pipe Manufacturing Company, Philadelphia, Pa.: Photographs of water-works construction, etc.
- Baldwin, D. H., & Co., Cincinnati, Ohio: Model of modern United States piano factory, demonstrating engineering construction as applied to industrial productions.
- Belknap, W. E., New York City: Photographs of harbor work, etc.
- Berlin Iron Bridge Company, The, East Berlin, Conn.: Designs and drawings of steel construction in the United States.
- Board of park commissioners, Cambridge, Mass.: Reports.
- Board of street commissioners, Cambridge, Mass.: Reports.
- Boller, Alfred P., New York: Photographs of bridge construction.
- Boston Terminal Company, Boston, Mass.: Maps, plans, photographs, etc., showing the terminal facilities at the city of Boston.

- Boston transit commission, Boston, Mass.: Maps, plans, photographs, and models showing the building of the subway for the use of street railways.
- Broadway Chambers, The, New York: A collective exhibit illustrating the materials and construction of an American steel office building in New York City. Contributors: Bradley & Currier Company, New York, interior woodwork; Brooklyn Electric Equipment Company, Brooklyn, electric lighting; Bullock Electric Company, Cincinnati, Ohio, electric generators; Byrne, Thomas J., New York, plumbing; Carnegie Steel Company, Pittsburg, Pa., steel frame; Clonbrock Steam Boiler Company, Brooklyn, boilers and fittings; Empire City Marble Company, New York, marble; Fuller, George A., Company, New York, builders' models; Gilbert, Charles, New York and St. Paul, Minn., architect; Hecla Iron Works, Brooklyn, N. Y., iron supplies; Otis Elevator Company, New York, elevators; Payne Engineering Company, New York, engines; Peirce, John, New York, granite; Perth Amboy Terra Cotta Company, Perth Amboy, N. J., terra cotta; Pittsburg Terra Cotta Lumber Company, Pittsburg, Pa., fireproofing; Purdy & Henderson, New York, consulting engineers; Russel & Irwin Manufacturing Company, New York, hardware; Taylor, Henry, Lumber Company, Lafayette, Ind., lumber construction; Wells & Newton Company, New York, steam heating.
- Brown, William M., jr., Boston, Mass.: Photographs of sewerage work.
- Caldwell, W. E., & Co., Louisville, Ky.: Photograph of water tank.
- California Paris Exposition Commission, San Francisco, Cal.: Geographic charts to be exhibited with the relief map of the State.
- Cambria Steel Company, Johnstown, Pa.: Painting of their Johnstown works.
- Chicago Sanitary District, Security Building, Chicago: Three models of the Chicago drainage canal, showing the full canal, the controlling works, and the heaviest rock cutting.
- Coolidge, C. A., and Morin-Goustiaux, G., Chicago, Ill., and Paris, France: Designs for United States National Pavilion.
- Cummings, Robert A., Owensboro, Ky.: Photographs of river-bank protection and of grain elevators *Thetis* and *Isis*.
- Department of public works, Philadelphia, Pa.: Photographs illustrating the work of the bureau of surveys of the city of Philadelphia.
- Department of transportation, United States Commission to Paris, Chicago: Publications, proceedings, and reports relating to civil engineering and public works.
- Dun, James, chief engineer Atchison, Topeka and Santa Fe Railway Company, Topeka, Kans.: Photographs of bridge construction and river improvement.
- Engineering News Publishing Company, New York: Publications—Engineering News and books on engineering subjects.
- Gemmell, R. C., State engineer, Salt Lake City, Utah: Photographs of public works.
- Gray, Samuel M., Providence, R. I.: Photographs of public works.
- Green, Bernard R., superintendent Library buildings and grounds, Washington, D. C.: Photographs of engineering construction, etc.
- Haupt, Louis M., 107 North Thirty-fifth street, Philadelphia, Pa.: Models of the alluvial bar at Aransas Pass, Tex., on the Gulf coast.
- Hermany, Charles, Louisville, Ky.: Photographs of waterworks construction.
- Hickley, H. V., Muscogee, Ind. T.: Photographs of bridge construction.
- Hoff, Olaf, Minneapolis, Minn.: Photographs of engineering structures.
- Illinois Central Railroad Company, Chicago: A model of a ballast floor trestle.
- Johnson, Wallace C., Niagara Falls, N. Y.: Photographs of waterpower and transmission construction.
- Jorgensen, Edward C. F., Chicago, Ill.: Drawings of exterior design of United States machinery building at Vincennes.
- Kansas City and Memphis Railway and Bridge Company, Kansas City, Mo.: Model of the Memphis Bridge, with photographs.

- Kenly, William L., chief engineer, water department, Baltimore, Md.: Photographs of public works.
- King Bridge Company, Cleveland, Ohio: Photographs of bridge construction.
- Kuichling, Emil, Rochester, N. Y.: Photographs of waterworks construction.
- Lawrence sewerage board, Lawrence, Mass.: The Lawrence sewerage plant, plans, and photographs.
- Leavitt, Charles W., New York: Photographs of public works.
- Llewellyn, Frank J., Minneapolis, Minn.: Photographs of engineering structures.
- Long Island Railroad Company, New York City: Maps and photographs of the railroad, showing the plans of the line and main engineering features.
- Loweth, Charles F., C. E., St. Paul, Minn.: Photographs of engineering construction.
- McGuire, James C., New York: Photographs of engineering construction.
- Massachusetts, Commonwealth of, Boston, Mass.: A map of the Commonwealth, showing the steam railroad and street-railway lines.
- Metropolitan park board, Boston, Mass.: Maps, plans, photographs, and reports.
- Metropolitan sewerage board, Boston, Mass.: Maps, plans, photographs, and reports.
- Metropolitan water board, Boston, Mass.: Maps, plans, photographs, and reports.
- Mississippi River Commission, U. S. A., St. Louis, Mo.: Models, relief maps, plans, photographs, etc., illustrating river improvement and apparatus used for that purpose.
- Missouri Valley Bridge and Iron Works, Leavenworth, Kans.: Photographs of steel structures.
- Modjeski, Ralph, Chicago: Photographs of the Rock Island Bridge.
- Munster, A., city engineer, St. Paul, Minn.: Photographs of bridge construction.
- New York, City of: Topographical maps of New York City in 1700, 1800, and 1900. A relief map of the city in 1776.
- Ockerson, J. A., 1119 Fullerton Building, St. Louis, Mo.: River improvement, mapping machine, survey marks, and targets.
- Ostrom, John N., Pittsburg, Pa.: Photographs of bridge construction.
- Phoenix Bridge Company, Phoenixville, Pa.: Photographs of bridge construction.
- Pitt & Scott, 39 Broadway, New York: Models, plans, maps of transportation of merchandise.
- Roebing's, John A., Sons Company: Model of Brooklyn Suspension Bridge.
- Sonne, Otto, Boston, Mass.: Photographs of a profile-taking machine.
- Standard Electric Company of California, San Francisco: Relief map, illustrating power transmission.
- State board of health, Boston, Mass.: Plans, photographs, reports, etc.
- Thacher, Edwin, Paterson, N. J.: Photographs of river bridge construction.
- United States Express Company, 49 Broadway, New York: Appliances pertaining to the transportation and delivery of express material.
- Vickers, Thomas McE., Syracuse, N. Y.: Photographs of waterworks.
- Warren City Boiler Works, Warren, Ohio: Photographs of water tanks.
- West Gallatin Irrigation Company of Montana, Manhattan, Mont.: Photographs of engineering work.
- Wilkins, George S., Chicago: Photographs of public works.
- Wrought Iron Bridge Company, Canton, Ohio: Photographs of bridge construction.
- Youngstown Bridge Company, Youngstown, Ohio: Photographs of bridge construction, etc.

CLASS 30.—*Carriages and wheelwrights' work. Automobiles and cycles.*

- American Electric Vehicle Company, 1545 Michigan avenue, Chicago: Various types of automobiles.
- American Roller Bearing Company, Boston, Mass.: Automobile bearings and automobiles.

- American Saddle Company, Elyria, Ohio: Bicycle saddles, tool bags, etc.
- Ball and Pedal Factory, Cleveland, Ohio: Bicycle pedals, steel balls, stampings, etc.
- Buffalo Factory, American Bicycle Company, Buffalo, N. Y.: Envoy and Fleetwing bicycles.
- Chain Factory, American Bicycle Company, Indianapolis, Ind.: Bicycle chains.
- Chicago Handle Bar Company, Chicago, Ill.: Bicycle handle bars.
- Cleveland Axle Manufacturing Company, Canton, Ohio: Carriage and wagon axles.
- Cleveland Factory, American Bicycle Company, Thomsonville, Conn.: Cleveland chain and chainless bicycles.
- Cleveland Machine Screw Company, Cleveland, Ohio: Automobiles and automobile supplies.
- Columbia and Electric Vehicle Company, Hartford, Conn.: Electric automobile vehicles, petroleum automobile vehicles; station equipment and apparatus for charging and transferring the storage batteries of electric automobiles.
- Columbia Factory, American Bicycle Company, Hartford, Conn.: Columbia chainless and chain and Hartford bicycles.
- Columbus Buggy Company, Columbus, Ohio: Light and heavy vehicles for business or pleasure.
- Columbus Factory, American Bicycle Company, Columbus, Ohio: Columbus bicycles for jobbing trade.
- Consolidated Rubber Tire Company, 40 Wall street, New York: Rubber-tire wheels and wheels with roller-bearing axles.
- Crawford Factory, American Bicycle Company, Hagerstown, Md.: Crawford bicycles.
- Crescent Factory, American Bicycle Company, Chicago: Crescent chainless and chain bicycles.
- Electric Vehicle Company, 100 Broadway, New York: Automobile vehicles.
- Fay Factory, American Bicycle Company, Elyria, Ohio: Fay juvenile bicycles.
- Featherstone Factory, American Bicycle Company, Chicago: Featherstone bicycles.
- Freeport Factory, American Bicycle Company, Freeport, Ill.: Phoenix bicycles.
- Geneva Factory, American Bicycle Company, Geneva, Ohio: Geneva bicycles for jobbing trade.
- Grand Rapids Cycle Company, Grand Rapids, Mich.: Clipper chainless and chain bicycles.
- Imperial Factory, American Bicycle Company, Chicago: Imperial bicycles.
- Lamb Factory, American Bicycle Company, Chicopee Falls, Mass.: Spalding chainless and chain bicycles.
- Locomobile Company of America, 11 Broadway, New York City: Steam automobiles.
- Milwaukee Factory, American Bicycle Company, North Milwaukee, Wis.: Meiselsbach, Famous, and Carnival bicycles.
- Monarch Factory, American Bicycle Company, Chicago: Monarch chainless and chain bicycles, Waverly chain bicycles.
- North Buffalo Factory, American Bicycle Company, North Buffalo, N. Y.: Niagara bicycles.
- Nyaack Factory, American Bicycle Company, Nyaack, N. Y.: Nyaack bicycles.
- Plymouth Factory, American Bicycle Company, Plymouth, Ind.: Bicycle wood rims and guards, etc.
- Rambler Factory, American Bicycle Company, Chicago: Rambler bicycles.
- Reading Factory, American Bicycle Company, Reading, Pa.: Stover, Pennant, and Mars bicycles.
- Riker Electric Vehicle Company, Elizabethport, N. J.: Automobiles and separate parts.
- Rubber Tire Wheel Company of America, 11 Broadway, New York: The "Kempshall" rubber tire for light or heavy automobiles.
- Shelby Factory, American Bicycle Company, Shelby, Ohio: Ideal bicycles.

- Smith Parts Factory, American Bicycle Company, Milwaukee, Wis.: Bicycle parts, stampings, etc.
- Sterling Factory, American Bicycle Company, Kenosha, Wis.: Sterling chainless and chain bicycles.
- Syracuse Factory, American Bicycle Company, Syracuse, N. Y.: Stearns, Barnes, and Syracuse bicycles.
- Thomas, John P., 439 Thirty-first street, Chicago: A double-ball bearing axle, with an inner revolving sleeve.
- Thompson Parts Factory, American Bicycle Company, Chicago: Bicycle frame sets, stampings, etc.
- Toledo Factory, American Bicycle Company, Toledo, Ohio: Cleveland chainless and chain, and Viking bicycles.
- Tribune Factory, American Bicycle Company, Erie, Pa.: Tribune chainless and chain bicycles.
- Veeder Manufacturing Company, Hartford, Conn.: Cyclometers for bicycles and automobiles.
- Westfield Factory, American Bicycle Company, Westfield, Mass.: Westfield bicycles.
- Whitney Motor Company, The, New York: Automobiles.

CLASS 31.—*Saddlery and harness.*

- Hallanan, M., 186 West Fourth street, New York: Rubber horseshoe pads and horseshoes.
- McKerron, J. A., San Francisco, Cal.: Horse boots, harness, saddles, parts of harness, and materials pertaining to harness and saddlery.
- O'Kane, J., San Francisco, Cal.: Harness, saddles, parts of harness, and materials pertaining to harness and saddlery.

CLASS 32.—*Equipment for railways and street railways.*

- Allis, Edward P., Company, Milwaukee, Wis.: Photographs of engines for generating electric power for street railways.
- American Car and Foundry Company, St. Louis, Mo.: Railroad equipment.
- American Car Company, St. Louis, Mo.: Photographs of car bodies.
- American Steel and Wire Company: Railroad gates and fences.
- Appleton, T., Houghton, Mich.: Photographs of railroad construction.
- Ashcroft Manufacturing Company, New York: Steam gauge, displayed on Baldwin locomotive.
- Auditor, West Virginia State, Charleston, W. Va.: Reports.
- Babcock & Wilcox Company, New York: Photographs of power-house stations.
- Baldwin Locomotive Works, Philadelphia, Pa.: Express passenger locomotive. Freight locomotive, Mogul type.
- Brill, J. G., Company, Philadelphia, Pa.: Working models in brass of trucks for tramway electric cars, full-sized cars, and trucks.
- Brown, Harold P., 120 Liberty street, New York City: Photographs of plastic rail bonds.
- Chicago, Rock Island and Pacific Railway: Pictures, etc.
- Chisholm & Moore Manufacturing Company, Cleveland, Ohio: Photographs of engineering and railroad machinery.
- Comptroller of the Treasury, New Jersey State, Trenton, N. J.: Railroad and canal reports.
- Consolidated Car Fender Company, Providence, R. I.: Photograph of car fender.
- Consolidated Car Heating Company, Albany, N. Y.: Photographs of cars and car-heating apparatus.
- Continuous Rail Joint Company of America, Newark, N. J.: Rail joints, small sections, and photographs.

- Cornell University, College of Civil Engineering of, Ithaca, N. Y.: Proceedings.
- Corporation Commission, North Carolina, Raleigh, N. C.: Reports.
- Crosby Steam Gauge and Valve Company, Boston, Mass.: Safety valves, on Baldwin locomotive.
- Diamond State Steel Company, Wilmington, Del.: Bolts, nuts, spikes, fish plates, and angle bars for railroads.
- Doane, W. A., Meadville, Pa.: Photographs of railroad-bridge construction.
- Engineering Record, New York City: Publication.
- Engineering Society, Iowa, Cedar Rapids, Iowa: Proceedings.
- Engineering Society, Michigan, Climax, Mich.: Proceedings.
- Engineering Societies, Journal of the Association of, Philadelphia, Pa.: Journal.
- Engineering, Western Society of, Chicago: Proceedings.
- Engineers and Surveyors, Illinois Society of, Peoria, Ill.: Proceedings.
- Engineers, Civil, American Society of, New York: Proceedings.
- Engineers' Club of Cincinnati, Cincinnati, Ohio: Proceedings.
- Engineers' Club of Philadelphia, Philadelphia, Pa.: Proceedings.
- Engineers' Club of St. Louis, St. Louis, Mo.: Proceedings.
- Engineers, Montana Society of, Helena, Mont.: Proceedings.
- Engineers' Society of Western Pennsylvania, Pittsburg, Pa.: Proceedings.
- Equalization, Wyoming State Board of, Cheyenne, Wyo.: Reports.
- Fairbanks, Morse & Co., Franklin and Monroe streets, Chicago: Petroleum-motor cars, hand cars, push car, and velocipede cars.
- Galena Oil Company, Franklin, Pa.: Lubricating oils for railroads, street railways, etc.
- Goodwin Car Company, New York: Models of dump cars with air brakes and air dumping apparatus. Attachments to change into armor car.
- Gould Coupler Company, 25 West Thirty-third street, New York City: Master car-builders' couplers, vestibule, and continuous platforms.
- Hall, E. L., 50 North Twenty-third street, Philadelphia, Pa.: Headlight, displayed on Baldwin locomotive.
- Hendricks Brothers, 49 Cliff street, Philadelphia, Pa.: Furnace material displayed on Baldwin locomotive.
- Hipwood-Barrett Car and Fender Company, 66 Broadway, New York: Photographs of car fenders.
- Hotchkiss, C. W., Chicago: Outline plans of railroad engineering.
- International Brake-Shoe Company, Old Colony Building, Chicago: Brake shoes and diagrams of tests.
- International Pneumatic Railway Signal Company, Rochester, N. Y.: Railway-signal apparatus.
- Johnson, Thomas H., Pittsburg, Pa.: Photographs of railroad construction.
- Kimball, George A., Boston, Mass.: Photographs of railroad construction.
- Leonhardt Wagon Manufacturing Company, Baltimore, Md.: Photographs of revolving tower wagon for use on street railways.
- McCann, Thomas H., Hoboken, N. J.: Photographs of street-railway construction, etc.
- McCardell, J. R., & Co., Trenton, N. J.: Photographs of Trenton trolley wagon, used on street railways.
- McConway & Torley Company, The, Pittsburg, Pa.: Janney automatic car couplers.
- McKee, Fuller & Co., Catasauqua, Pa.: Car wheels and axles.
- National Malleable Castings Company, Cleveland, Ohio: Car couplers and attachments.
- National Railway Publication Company, New York: Official guide of the railways and steam navigation lines of the United States, Porto Rico, Canada, Mexico, and Cuba.

- National Tube Works, 267 South Fourth street, Philadelphia, Pa.: Tubes displayed on Baldwin locomotives.
- New York Air Brake Company, The, 66 Broadway, New York City: Automatic quick-action compressed-air brakes for a train of 50 freight cars and for a passenger train of 10 cars, models, diagrams, etc.
- New York Car Wheel Works, Buffalo, N. Y.: Photographs of railroad construction.
- Parkhurst, H. W., engineer of bridges, Illinois Central Railway system, Chicago: Photographs of railroad construction.
- Pennsylvania Railroad Company: Painting and photographs of trains.
- Porter, H. K., Company, Pittsburg, Pa.: Photographs of light locomotives.
- Powers, Joseph A., Lansingburg, N. Y.: Photographs of railroad construction.
- Pressed Steel Car Company, Pittsburg, Pa.: Pressed-steel cars, car trucks, and bolsters.
- Pullman Company, The, Chicago: Photographs illustrating the development of sleeping cars.
- Q. & C. Company, Chicago: Samples of ties illustrating protection afforded by tie plates and method of applying same. Illustrations and photographs.
- Railroad and warehouse commission, Illinois State, Springfield, Ill.: Reports.
- Railroad and warehouse commission, Minnesota State, St. Paul, Minn.: Reports.
- Railroad and warehouse commission, Missouri State, Jefferson City, Mo.: Reports.
- Railroad Association, The Western, Chicago: Proceedings.
- Railroad, Chattanooga and Lookout Mountain, Chattanooga, Tenn.: Photographs of double incline railway.
- Railroad, Chicago, Milwaukee and St. Paul, Chicago: Model of a Howe bridge, with approaches.
- Railroad commission, Alabama State, Montgomery, Ala.: Reports.
- Railroad commission, Arkansas State, Little Rock, Ark.: Reports.
- Railroad commission, Florida State, Tallahassee, Fla.: Reports.
- Railroad commission, Georgia State, Atlanta, Ga.: Reports.
- Railroad commission, Kentucky State, Frankfort, Ky.: Reports.
- Railroad commission, Massachusetts State, Boston, Mass.: Reports.
- Railroad commission, Mississippi State, Jackson, Miss.: Reports.
- Railroad commission, New Hampshire State, Concord, N. H.: Reports.
- Railroad commission, Texas State, Austin, Tex.: Reports.
- Railroad commission, Vermont State, Burlington, Vt.: Reports.
- Railroad commission, Virginia State, Richmond, Va.: Reports.
- Railroad commissioner, Rhode Island State, Providence, R. I.: Reports.
- Railroad commissioners, California State board of, San Francisco, Cal.: Reports.
- Railroad commissioners, Connecticut board of, Hartford, Conn.: Reports.
- Railroad commissioners, Iowa State board of, Des Moines, Iowa: Reports.
- Railroad commissioners, Kansas State board of, Fort Scott, Kans.: Reports.
- Railroad commissioners, Maine State, Augusta, Me.: Reports.
- Railroad commissioners, New York State board of, Albany, N. Y.: Reports.
- Railroad commissioners, South Carolina State, Columbia, S. C.: Reports.
- Railroad commissioners, South Dakota State, Sioux Falls, S. Dak.: Reports.
- Railroad commissioners, Wisconsin State, Madison, Wis.: Reports.
- Railroad Company, Lehigh Valley, New York: Photographs of railroad construction.
- Railroad Company, Michigan Central, Detroit, Mich.: Photographs of railroad construction.
- Railroad Company, Philadelphia and Reading, Philadelphia, Pa.: Photographs of railroad construction.
- Railroad Gazette, New York: Publication upon engineering.
- Railroad, New York Central and Hudson River, Albany, N. Y.: Photographs of railroad construction.

- Railroad, Northern Pacific, St. Paul, Minn.: Atlas of standard bridge plans.
- Railroads and telegraphs, Ohio State commissioner of, Columbus, Ohio: Reports.
- Railroads, commissioner of, Michigan State, Lansing, Mich.: Reports.
- Railroads, commissioners of, North Dakota State, Bismarek, N. Dak.: Reports.
- Railway Accounting Officers, Association of American, Chicago: Proceedings.
- Railway Age, Chicago: Publication—The Railway Age.
- Railway and Engineering Review, Chicago: Publication.
- Railway Association, The American, New York: Proceedings.
- Railway, Boston and Maine, Boston, Mass.: Photographs and descriptive publications.
- Railway Car Accountants, International Association of, Cedar Rapids, Iowa: Proceedings.
- Railway, Chicago and West Michigan, Grand Rapids, Mich.: Photographs of railroad construction.
- Railway Club, Central, of Buffalo, N. Y.: Proceedings.
- Railway Club, New England, Springfield, Mass.: Proceedings.
- Railway Club, New York, Brooklyn, N. Y.: Proceedings.
- Railway Club, Northwest, Minneapolis, Minn.: Proceedings.
- Railway Club, St. Louis, Mo.: Proceedings.
- Railway Club, Western, Chicago: Proceedings.
- Railway Company, Colorado Midland, Denver, Colo.: Photographs of railroad and tunnel construction.
- Railway Company, Gulf, Colorado and Santa Fe, Galveston, Tex.: Photographs of railroad machinery.
- Railway Company, Metropolitan West Side Elevated, Chicago: Photographs of elevated railway construction.
- Railway Company, Missouri Pacific, St. Louis, Mo.: Photographs of railroad work.
- Railway Company, Peoria and Eastern, Indianapolis, Ind.: Photographs of railroad construction.
- Railway General Passenger and Ticket Agents, American Association of, Cleveland, Ohio: Proceedings.
- Railway Master Car and Locomotive Painters' Association, Kent, Ohio: Proceedings.
- Railway Master Car Builders' Association, Chicago: Proceedings.
- Railway Master Mechanics, American Association of, Chicago: Proceedings.
- Railway Road Masters' Association of New England, Ware, Mass.: Proceedings.
- Railway Signaling Club, West Milwaukee, Wis.: Proceedings.
- Railway Superintendents of Bridges and Buildings, Association of, Concord, N. H.: Proceedings.
- Railway Telegraph Superintendents, Association of, Milwaukee, Wis.: Proceedings.
- Railways, Pennsylvania State bureau of, Harrisburg, Pa.: Reports.
- Reading Iron Company, Reading, Pa.: Tubes displayed on Baldwin locomotive.
- Ricker, George A., Buffalo, N. Y.: Photographs of railway construction.
- Road Masters' Association of America, Sterling, Ill.: Proceedings.
- Rodd, Thomas, chief engineer Pennsylvania lines west of Pittsburg, Pittsburg, Pa.: Photographs of track elevation.
- Scripture, Edward W., New Haven, Conn.: Color-sight testing instruments.
- Sellers, William, & Co., Incorporated, Philadelphia, Pa.: Self-acting injector.
- Signal Oil Company, Franklin, Pa.: Locomotive and car lubricating oils.
- Standard Steel Works, Philadelphia, Pa.: Railroad wheels, axles, tires, and forgings.
- Street Railway Association, American, Chicago: Proceedings.
- Street Railway Publishing Company, New York: Street Railway Journal.
- Surveyors and Civil Engineers, Ohio Society of, Columbus, Ohio: Proceedings.
- Taunton Locomotive Manufacturing Company, Taunton, Mass.: Photographs of light locomotives.

- Tax commissioner, Maryland State, Annapolis, Md.: Reports.
- Tax commissioners, Indiana State board of, Indianapolis, Ind.: Reports.
- Track elevation and depression commission, Chicago: Plans and photographs of track elevation and depression.
- Transportation, Nebraska State board of, Lincoln, Nebr.: Report.
- United States Metallic Packing Company, Philadelphia, Pa.: Metallic packing, displayed on Baldwin locomotive.
- Weber Railway Joint Manufacturing Company, New York: Railway joints and bonds, photographs and drawings.
- Westinghouse Air Brake Company, Pittsburg, Pa.: Brakes on locomotives.
- Wilgus, William J., New York: Photographs of railroad construction.
- Worth Bros. & Co., Coatesville, Pa.: Boiler material, displayed on Baldwin locomotive.
- Yard, E. J., Salt Lake City, Utah: Photographs of railroad construction.

CLASS 33.—*Material and equipment used in the mercantile marine.*

- Advance Coal Company, Pittsburg, Pa.: Model of towboat, with barges.
- Alleman, A., Brenham, Tex.: Live-saving apparatus.
- Allen, Frederick S., Cuttyhunk Island, Massachusetts: Live-saving apparatus.
- American Steel Barge Company, New York City: Models of whaleback barges and others.
- Arnold, Mrs. W. A., New York: Model of schooner yacht *Sachem*.
- Astor, John Jacob, New York: Model of electric yacht *Eutopian*.
- Atlantic Yacht Club, New York: Model of steam yacht *Presto*.
- Bagg, S. F., Tarrytown, N. Y.: Life-saving apparatus.
- Bartholomew, J. S., Guerneville, Cal.: Life-saving apparatus.
- Benson, Oliver, 111 Fourth avenue, New York: Life-saving apparatus.
- Bergfeldt, N. H., 341 East Fifty-ninth street, New York: Life-saving apparatus.
- Bethlehem Steel Company, South Bethlehem, Pa.: Photographs illustrating the manufacture of armor plate, ordnance, hollow or solid forged shafting, general forgings, and castings; commercial product steel forgings for marine and stationary engines, machine tools.
- Bolles, Charles E., 244 Fulton street, Brooklyn, N. Y.: Yachting and marine photographs.
- Bowles, Francis T., naval constructor, United States Navy: Life-saving apparatus.
- Boyle, Patrick F., 17 Conlin court, Worcester, Mass.: Life-saving apparatus.
- Bradley, J. D., Barker, Niagara County, N. Y.: Life-saving apparatus.
- Bragard, A., Donaldsonville, La.: Life-saving apparatus.
- Brokaw, W. Gould, New York Yacht Club, New York: Model of schooner yacht *Amorita* and painting of same.
- Bullock, George, Seawanhaka Corinthian Yacht Club, New York: Model of sloop yacht *Narota*.
- Burton-Hoffman Photo Company, 9 West Forty-second street, New York: Yachting and marine photographs.
- Busk, Mrs. J. R., Newport, R. I.: Model of schooner yacht and model of schooner yacht *Mischief*.
- Cainsbenty, Frank, 27 North Hoyne avenue, Chicago: Life-saving apparatus.
- Carley, Horace L., 123 Huntington avenue, Hyde Park, Mass.: Life-saving apparatus.
- Carter, W. C., Delaware, Ohio: Life-saving apparatus.
- Castillo, Ernest, West Tampa, Fla.: Life-saving apparatus.
- Chapman, W. H., Salt Lake City, Utah: Life-saving apparatus.
- Cobb, J. I., Salina, Kans.: Life-saving apparatus.
- Columbia Safety S. S. Company, Boston, Mass.: Life-saving apparatus.
- Crawshaw, C. R., Jonesville, Va.: Life-saving apparatus.
- Darlot, Cyrus H., 455 East Fifty-seventh street, New York: Life-saving apparatus.

- Department of transportation, United States Commission to the Paris Exposition: A collective exhibit illustrating the development of American yachts.
- Dickenson, Charles G. L. O., Washington, D. C.: Life-saving apparatus.
- Dingman, J. A., Spring Valley, Ill.: Life-saving apparatus.
- Doremus, Dr., College, City of New York: Life-saving apparatus.
- Drein, Thomas, & Co., Wilmington, Del.: Life-saving apparatus.
- Dubreuil, Victor, 107 West Forty-third street, New York: Life-saving boat.
- Duncan, John P., New York Yacht Club, New York: Model of steam yacht *Kanawha*.
- Elliott, William R., 6222 South Halsted street, Chicago: Life-saving apparatus.
- Ellis, W. H., Fremont, Nebr.: Life-saving apparatus.
- Flint, Charles R., New York Yacht Club, New York: Model of a steam yacht.
- Forbes, J. Malcolm, Boston, Mass.: Model of sloop yacht *Puritan*.
- Furgerson, Alan R., 253 Broadway, New York: Life-saving apparatus.
- Gardner & Cox, 1 Broadway, New York City: Half models of sloop yacht *Syce* and of schooner yacht *Quisetta*.
- German, Solomon, Davidsonville, Md.: Life-saving apparatus.
- Goldberg, B. W., 5 Beekman street, New York: Life-saving apparatus.
- Gondy, Arthur L., 1400 Louisiana street, Lawrence, Kans.: Life-saving apparatus.
- Goodwin Car Company, New York: Model of dumping barge.
- Hara, G. R., Salida, Colo.: Life-saving apparatus.
- Harris, Henry W., New York Yacht Club, New York: Oil painting of schooner yacht *Quisetta*.
- Hatton, J. H., Fort Covington, New York: Life-saving apparatus.
- Hedberg, Alexander S., 9310 Evans avenue, Chicago: Life-saving apparatus.
- Herbert, Frederick D., 20 Broad street, New York: Life-saving apparatus.
- Hichborn, Philip, Chief Constructor, United States Navy, Washington, D. C.: Life-saving buoy.
- Higginson, H. C., Orange Lake Ice Yacht Club, New York: Model of ice yacht *Cold Wave*.
- Higginbotham, Elmer E., 6952 Parnell avenue, Chicago: Life-saving apparatus.
- Hoy, M. P., Rosedale, Wash.: Life-saving apparatus.
- Hughes, John P., 35 Walcott street, Brooklyn, N. Y.: Life-saving apparatus.
- International Navigation Company, New York: Models, pictures, photographs, etc., of the steamships and other property of the company, descriptive of trans-Atlantic steamship business.
- Iowa Iron Works, Limited, Dubuque, Iowa: Model of a stern-wheel towboat.
- Irwin, Charles P., Red Bank, N. J.: Full-rigged model of ice yacht *Georgie*.
- Ivers, John J., Lowell, Mass.: Life-saving apparatus.
- Jaques, W. H., 277 Clarendon street, Boston, Mass.: Life-saving apparatus.
- Johnson, J., Bridgeport, Ala.: Life-saving apparatus.
- Karnowsky, William, Florence, Oreg.: Life-saving apparatus.
- Kennedy, W. J., Pier 14, North River, New York: Life-saving apparatus.
- Knickerbocker, Willis, New Lenox, Ill.: Life-saving apparatus.
- Kudo, M., Seattle, Wash.: Life-saving apparatus.
- Lake, Levin, Charles and Saratoga streets, Baltimore, Md.: Life-saving apparatus. Oil shell.
- Leister, William Hammond, Westminster, Md.: Life-saving apparatus.
- Leschbrandt, E., 206 North Sixth street, Philadelphia, Pa.: Life-saving apparatus.
- Little, Joseph H., 105 East One hundred and twenty-third street, New York: Life-saving apparatus.
- Lozier Manufacturing Company, Cleveland, Ohio: Gasoline launch.
- Lund, Waldemar, New York and 33 Fredericksberggade, Copenhagen, Denmark: Life-saving apparatus.
- Lyden, M. J., 8 Patterson street, Worcester, Mass.: Life-saving apparatus.

Lyon, Leonidas S., jr., Flatonia, Tex.: Life-saving apparatus.

McKinnon, James W., 713 East One hundred and thirty-eighth street, New York: Life-saving apparatus.

McManus, Thomas F., Boston, Mass.: Half models of pilot boat *America*, fishing schooner *Juniata*, fishing boats *James S. Steele* and *Maggie Sullivan*.

Magnerson, J. F., 120 Sutter street, San Francisco, Cal.: Life-saving apparatus.

Magoun, F. P., New York Yacht Club, New York: Model of steam yacht *Viper*.

Marsh, John N., Williamstown, N. J.: Life-saving apparatus.

Massachusetts, State of, Boston, Mass.: Collective exhibit of models of vessels as follows:

Name.	Kind.	Date of construction.
Sparrow Hawk	Early colonial	1626
Manchester	Fishing schooner	1713
Black Sloven	Chebacco boat	1790
Lucy	Old style dogbody boat	1805
John W. Herbert	Fishing schooner	1848
Congress	do	1849
Harry L. Belden	Mackerel schooner	1889
Nannie C. Bohlan	Fishing schooner	1890

Massenge, August, 233 Fulton street, Grand Rapids, Mich.: Life-saving apparatus.

Merriman, C. S., Villisca, Iowa: Life-saving apparatus.

Miller, Clark A., New York Yacht Club, New York: Model of schooner yacht *Mohegan*.

Mississippi River Commission, United States of America, St. Louis, Mo.: Models of towboats and barges used on the Mississippi River.

Morgan, E. D., New York Yacht Club, New York: Models of sloop yacht *Mayflower*, schooner yacht *Constellation*, sloop yacht *Gloriana*.

Morgan, J. Pierpont, New York Yacht Club, New York: Model of steam yacht *Corsair*.

Mosher, C. D., 1 Broadway, New York City: Models of steam yachts.

Motley, Thornton N., New York Yacht Club, New York: Model of schooner yacht *Magic*.

New York Boat Oar Company, 69 West street, New York: Ash, spruce, and spoon oars; handspikes, mast hoops, etc.

New York Yacht Club, New York: Models of sloop yachts *Defender* and *Vigilant* and of schooner yacht *Sappho*.

Nuque, Gustave, Philadelphia, Pa.: Life-saving apparatus.

O'Brien, H. Jefferson, West Superior, Wis.: Life-saving apparatus.

Omeyer, Emile, 365 West Thirty-sixth street, New York: Life-saving apparatus.

O'Neill, William E., Chicago Stock Exchange, Chicago: Life-saving apparatus.

Ostermeyer, William, 3351 California avenue, St. Louis, Mo.: Life-saving apparatus.

Paine, Gen. A. J., Boston, Mass.: Model of sloop yacht *Volunteer*.

Pendleton, Andrew F., Franklin, Mass.: Life-saving apparatus.

Perley, C. B., 1001 Bush street, San Francisco, Cal.: Life-saving apparatus.

Phoenix, Lloyd, New York Yacht Club, New York: Models of auxiliary yacht *Intrepid*.

Plecher, Andrew, Habersham and Second streets, Savannah, Ga.: Life-saving apparatus.

Postley, Clarence A., Larchmont Yacht Club, New York: Painting of schooner yacht *Colonia*.

Redmond, Edmond, Rochester, N. Y.: Life-saving apparatus.

Richens, John M., Fitzgerald, Ga.: Life-saving apparatus.

Ridley, Chris, 216 Laurel street, West Tampa, Fla.: Life-saving apparatus.

- Rolf, A. A., 125 La Salle street, Chicago: Life-saving apparatus.
- Savage, J. M., 10 North Desplaines street, Chicago: Life-saving apparatus.
- Seawanhaka Corinthian Yacht Club, Long Island, New York: Half models racing and pleasure yachts.
- Sinclair, W. A., South Bend, Ind.: Life-saving apparatus.
- Smith, George B., Indianola, Nebr.: Life-saving apparatus.
- Spalding St. Lawrence Boat Company, Ogdensburg, N. Y.: St. Lawrence River skiff and Canadian type of paddling canoe.
- Stanley, William E., Watsonville, Cal.: Life-saving apparatus.
- Stebbins, Charles M., Orange Lake Ice Yacht Club, New York: Model of ice yacht *Katita*.
- Stevens Institute, Hoboken, N. J.: Model of ferryboat *Hamburgh*.
- Stewart, S. N., 168 Jefferson avenue, Brooklyn, N. Y.: Life-saving apparatus.
- Sultemeyer, C. F., 1448 North Halsted street, Chicago: Life-saving apparatus.
- Tams, Lemoine & Crane, New York: Half model of schooner yacht *Endymion*.
- Taylor, W. H., Narragansett Pier, R. I.: Life-saving apparatus.
- Thatcher, H. L., Aurora, Ill.: Life-saving apparatus.
- Thibodran, Emlyde, Cohoes, N. Y.: Life-saving apparatus.
- Thompson, Edward D., 81 Fulton street, New York: Life-saving apparatus.
- Todd, W. E., Charleston, S. C.: Life-saving apparatus.
- Tunison, Mary L., 63 Franklin street, Trenton, N. J.: Life-saving apparatus.
- Universal Exposition Commission of the State of New York, New York: Models of schooner yachts *Madeline*, *Columbia*, and *America*.
- Van Cauenberg, Frank, 1204 Southwest street, Rockford, Ill.: Life-saving apparatus.
- Van Wye, G. P., Park Row building, New York: Life-saving apparatus.
- Wagner, W. F., Wabash, Ind.: Life-saving apparatus.
- Wright, Henry L., Walden, N. Y.: Life-saving apparatus.
- Warren, E. B., New York Yacht Club, New York: Model of steam yacht *Ellide*.

GROUP XVIII.—MILITARY AND NAVAL.

EXHIBITS REPRESENTING THE ARMY AND NAVY OF THE UNITED STATES OF AMERICA.

CLASS 116.—*Ordnance and equipment for artillery.*

- Department of the Navy, Bureau of Ordnance: Photographs of naval gun factory and of service arms; models of steel rifles; sample cartridge cases, cutlasses, and sword bayonets.
- Department of the Navy, navy-yard, New York: Photographs showing the equipment and facilities of the navy-yard.
- Bethlehem Steel Company, South Bethlehem, Pa.: Photographs illustrating the manufacture of armor plate, ordnance, and hollow or solid forged shafting, and general forgings and castings.
- Steele, W. F., New York: Photographs of gas plant installed in forge shop of United States naval gun factory, Washington, D. C.

CLASS 117.—*Military engineering and accessories.*

- Department of War, Signal Corps, United States Army: Photographs of field operations during Philippine insurrection; field telegraphs and telephones; signal flags; field-signal apparatus.

CLASS 118.—*Naval construction, hydraulics, torpedoes.*

- Department of the Navy, Washington, D. C.: Photographs of the docks, shops, and plant at the navy-yard, New York, of ships and men, showing life and training of ships' crews.

Department of the Navy, Bureau of Construction and Repair: Models and photographs of naval vessels, full and in section; models of ship appliances; photographs of United States naval vessels; naval electrical apparatus.

Department of the Navy, Bureau of Equipment: Standard marine and electrical apparatus and accessories, furnished by General Electric Company; samples of rope, flags, pennants, and signals.

Department of the Navy, Bureau of Navigation, Naval Academy: Photographs illustrating characteristic phases of cadet life and training at the United States Naval Academy, Annapolis, Md.

Department of the Navy, Bureau of Ordnance: Electric motor for ammunition hoist, rammer, or elevating; photographs showing manufacture of and practice with automobile and spar torpedoes.

Department of the Navy, Bureau of Steam Engineering: Photographs, drawings, and blue prints of types of engines for United States naval vessels; model of beam engine of a Pacific mail steamer.

American Ship Windlass Company, Providence, R. I.: Model of a steam capstan.

Babcock & Wilcox Company, New York: Photographs and plans, and a forged-steel header of the Babcock & Wilcox water-tube boilers of the U. S. S. *Chicago* and the U. S. S. *Atlanta*.

Blake, George F., Manufacturing Company, New York City: Model of a Blake vertical twin air pump.

Bowles, F. T., Naval Constructor, United States Navy: Full size working model of an electrically operated water-tight door.

Flagg, Ernest, architect, 35 Wall street, New York: Drawings and photographs of the buildings and grounds of the United States Naval Academy, Annapolis, Md.

General Electric Company, Schenectady, N. Y.: Photographs of electrical apparatus manufactured for the United States Navy and the United States Army.

Hichborn, Philip, Chief Constructor, United States Navy: Models of barbette turret for 12-inch breech-loading rifles and of Franklin life buoy.

Holland Torpedo Boat Company, New York City: Model of Holland submarine torpedo boat, type 7, 1900, designed to run at the surface or submerged.

Melville, George W., Engineer in Chief, United States Navy: Model of a water-tight door designed to be operated by hand or power.

Page Brothers & Co., Boston, Mass.: Marine electrical fixtures, United States Navy standard.

Pain's Fireworks Company, 12 Park place, New York City: Series of life-saving and signal rockets and signal lights.

Roelker, H. B., 41 Maiden Lane, New York: Photographs of Allen dense-air ice machine, as supplied to vessels of the United States Navy.

Sellers, William, & Co., Philadelphia, Pa.: Model of a 40-ton locomotive dock crane; capacity 64,000 pounds at 70 feet radius.

Williamson Brothers Company, Philadelphia, Pa.: Model of steam steering gear.

CLASS 119.—*Cartography—Hydrography—Various instruments.*

Department of the Navy, Washington, D. C.: Miscellaneous publications relating to Arctic exploration, canals, dockyards, gun foundries, and armor factories.

Department of the Navy, Bureau of Equipment: Publications showing the flags of maritime nations and the international code of signals. Patent log. Sounding apparatus.

Department of the Navy, Bureau of Equipment, Compass Office: United States Navy standard compensating binnacle, complete with correctors; Pelorus.

Department of the Navy, Bureau of Equipment, Hydrographic Office: Publications relating to hydrography, meteorology, and navigation; chart construction; characteristic charts; relief map.

- Department of the Navy, Bureau of Equipment, Naval Observatory: Photographs of buildings and instruments; records of astronomical observations; navigation instruments; observatory time.
- Department of the Navy, Bureau of Equipment, Nautical Almanac Office: The American Ephemeris and Nautical Almanac from 1855 to 1902.
- Department of the Navy, Bureau of Navigation: Report of the chief of bureau for 1898, and appendix to same.
- Department of the Navy, Bureau of Navigation, Office of Naval Intelligence: Publications—General information series; coaling, docking, and repair facilities of the world; war notes; war series.
- Negus, T. S. & J. D., New York: Marine chronometers; conning-tower binnacle; torpedo-boat compensating binnacle.
- Ritchie, E. S., & Sons, Boston, Mass.: Instruments of navigation, consisting of compasses, azimuth circles, pelorus, and magnetic instruments.

CLASS 120.—*Administrative departments.*

- Department of the Navy, Washington, D. C.: Seal of the Navy Department; medals voted by Congress to United States naval officers; photographs of ships and men illustrating life and training in the Navy.
- Department of the Navy, Bureau of Supplies and Accounts: Uniforms of petty officers and seamen of the United States Navy.
- Quartermaster's Department, United States Marine Corps: Uniforms, arms, and accouterments of the noncommissioned officers, enlisted men, and bandmen of the United States Marine Corps.

KEY AND TITLES TO ILLUSTRATIONS.

LIST OF PLATES FROM PHOTOGRAPHS OF TRANSPORTATION AND CIVIL ENGINEERING,
GROUP VI.

- E.- 1. View of exhibit on ground floor of palace of civil engineering and transportation, including engineering models, automobiles, etc.
- E.- 2. Another view of the same, including, also, engineering exhibit in gallery.
- E.- 3. Engineering exhibit of State of Massachusetts; in gallery of palace of civil engineering and transportation.
- E.- 4. Map of the city of New York; in gallery of palace of civil engineering and transportation.
- E.- 5. Locomotives in railroad building, Bois de Vincennes.
- E.- 6. Locomotive and steel-tired wheels in railroad building at Bois de Vincennes.
- E.- 7. Steel cars in railroad building at Bois de Vincennes.
- E.- 8. Exhibits of car couplings and signaling apparatus in railroad building, Bois de Vincennes.
- E.- 9. Signaling apparatus, railroad oils, steel-tired wheels, etc., in railroad building at Bois de Vincennes.
- E.-10. Air-brakes and steel-tired wheels, in railroad building at Bois de Vincennes.
- E.-11. Steel cars and bolsters, car couplings, and street cars, in railroad building at Bois de Vincennes.
- E.-12. Merchant marine. Façade of International Navigation Company. American Line.
- E.-13. Steamship models of the American line.
- E.-14. Façade of collective exhibit of American yachting.
- E.-15. Models illustrating history of American yachting.

- E.-16. Bicycle building at the Bois de Vincennes.
- E.-17. Merchant Marine Annex. Occupied by exhibit of the United States Post-Office Department and the Weather Bureau.
- E.-18. Models illustrating transportation of the mails, United States Post-Office Department.
- E.-19. Models illustrating transportation of the mails, United States Post-Office Department.

LIST OF EXHIBITORS ON UNITED STATES SPACE, GIVING THE NUMBER OF THEIR SPACE ON RECORD PLANS

GROUND FLOOR.

1. J. P. Thomas & Co.
2. American Bicycle Company.
3. Rubber Tire Wheel Company.
4. American Electric Vehicle Company.
5. The Bucyrus Company.
6. Pitt & Scott.
7. Cleveland Axle Company.
8. J. A. McKeren and J. O'Kane.
9. Veeder Manufacturing Company.
10. Mississippi River Commission.
- 10a. Deering Harvester Company.
11. Columbia Electric Vehicle Company.
12. Cleveland Machine Screw Company.
13. Riker Electric Vehicle Company.
14. Locomobile Company.
15. American Roller Bearing Company.
16. Hallanan, M.
17. United States Express Company.
18. Columbus Buggy Company.
19. Chicago Drainage Canal, Ingersoll-Sergeant Drill Company, Rand Drill Company, Lindon Bates, C. E., etc.
20. Broadway Chambers, steel frame building.
21. Goodwin Car Company.
22. Collective engineering exhibit.
23. D. H. Baldwin & Co.

GALLERY PALACE.

1. Relief map of State of California.
2. Library of engineering and railway literature.
3. Exhibit of State of Massachusetts.
4. Map of New York City.
5. Mississippi River Commission.
6. Model of Memphis bridge.
7. Model of ballasted trestle.
8. Model of Howe truss bridge.
9. Photographs of grain elevators.
10. Historical model of canal boat on which Lafayette journeyed from Albany to Buffalo on occasion of his last visit to the United States.
11. Carriage used by General Lafayette on occasion of his last visit to the United States.

RAILROAD BUILDING AT BOIS DE VINCENNES.

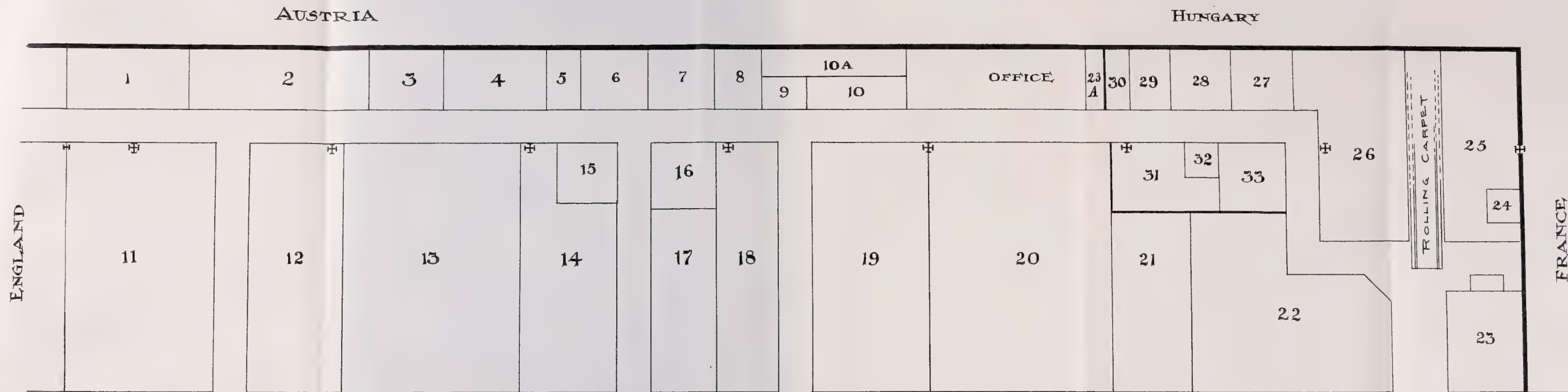
1. Pressed Steel Car Company.
- 2 and 3. McConway & Tooley.
4. International Brake Shoe Company.
5. New York Air Brake Company.
6. Fairbanks, Morse & Co.
7. Christenson air brake, Peckham street-car trucks, and other specialties exhibited by Robert Blackwell & Co.
8. McKee, Fuller & Co.
9. Galena Oil Company; Signal Oil Company.
10. International Pneumatic Signal Company.
11. Gould Coupler Company.
12. Standard Steel Works.
13. Baldwin Locomotive Works.
14. The J. G. Brill Company.
15. American Steel and Wire Company; National Malleable Castings Company.

AUTOMOBILE BUILDING AT VINCENNES.

16. Locomobile Company.
17. Columbia and Electric Vehicle Company.

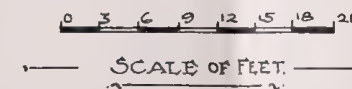
COMMERCE AND NAVIGATION.

1. Hamburg ferry.
2. Schooner yacht Yampa (model).
3. Fire-alarm box.
4. Ice yachts—Cold Wave, Jack Frost (models).
5. Seawanhoka, Corinthian Yacht Club (model).
6. Schooner yacht Corean (model).
7. Steam yacht Corsair (model).
8. Schooner yacht Amorita (model).
9. Schooner yacht Monhegan (model).
10. Alexander M. Lawrence (model).
11. Schooner yacht America (model).
12. Sloop yacht Mischief (model).
13. Schooners—Madeleine, Magic, Columbia (models).
14. Schooner yacht Sappho (model).
15. Sloop yachts—Puritan, Mayflower, Volunteer, Vigilant (models).
16. Defender (model).
17. Tugboat and float (model).
18. Schooner yacht Norseman (model).
19. Schooner yacht Constellation (model).
20. Ice yachts—George, Titina (models).
21. Schooner yacht Mrs. J. R. Bush (model).
22. Schooner yacht Sachem (model).
23. Steamer yacht Kanawha (model).
24. Twin-screw steamer Haverford (model).
25. U. S. M. S. S. St. Louis (model).
26. U. S. M. S. S. New York (model).
27. Twin-screw steamer Vauderland (model).
28. Hera (half model).
29. Shamrock and Columbia (photograph).
30. Well in the lead (photograph).
31. A trial trip (photograph).



MAIN AISLE OF PALACE

PARIS EXPOSITION OF 1900.
 PLAN OF INSTALLATION IN UNITED STATES SPACE
 PALACE OF CIVIL ENGINEERING AND TRANSPORTATION.
 GROUP VI.



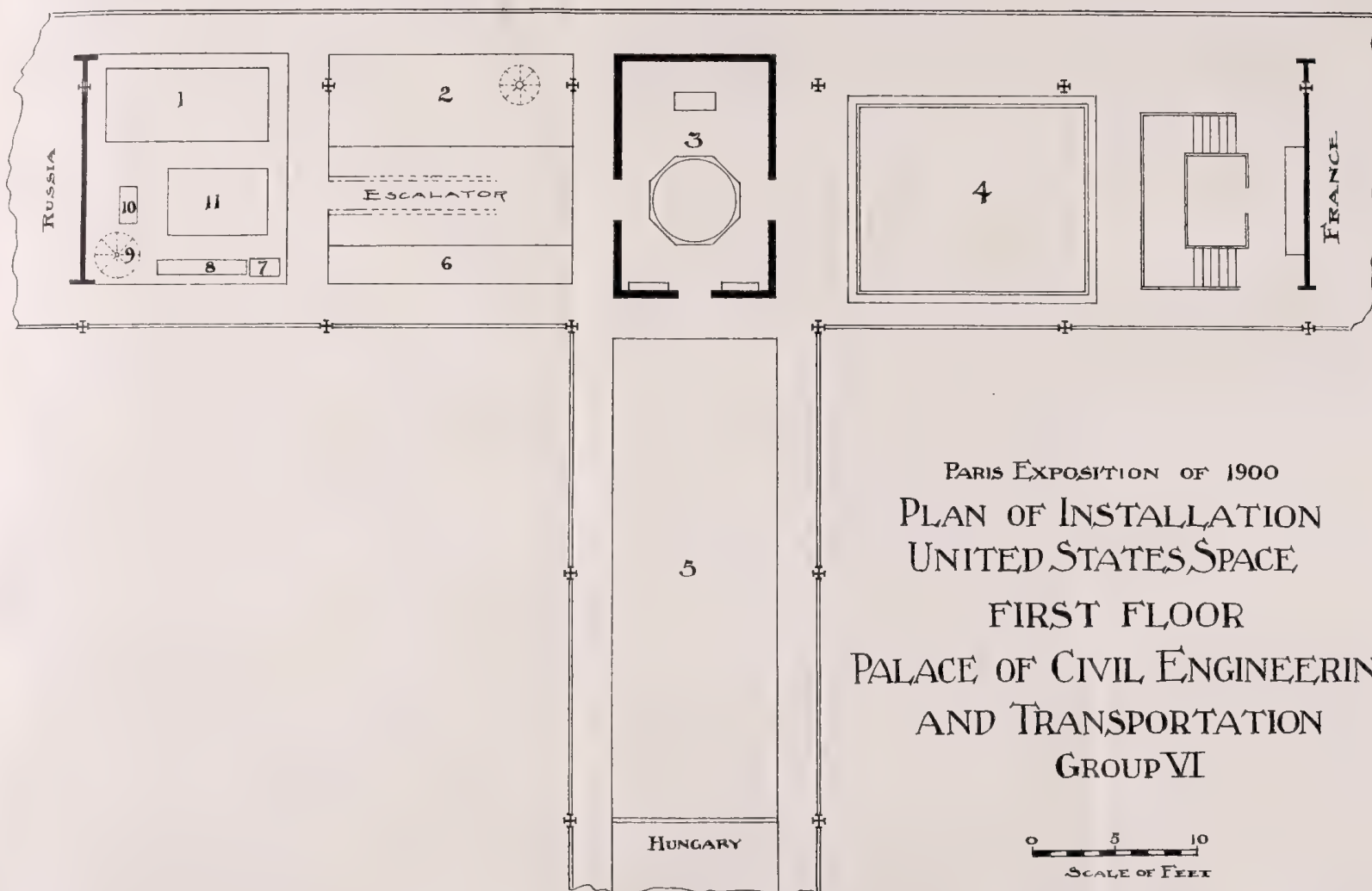
1823A

21	22	23	24	25	26
21	22	23	24	25	26

Scale of 1 inch = 10 feet

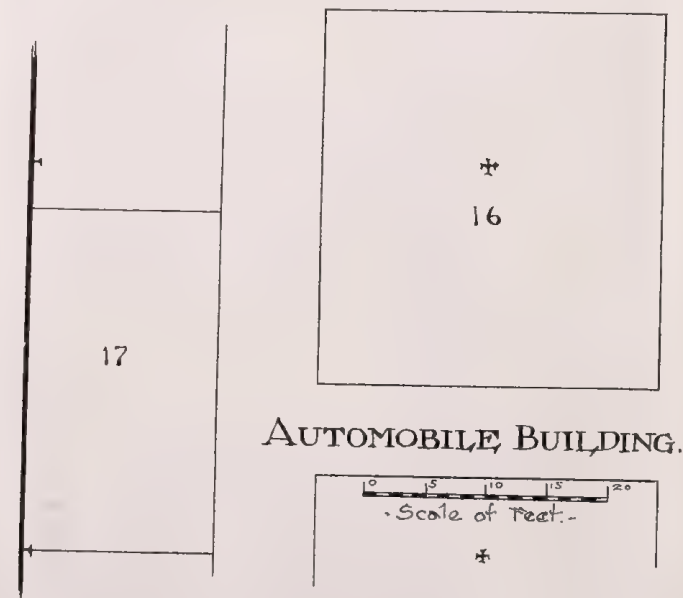
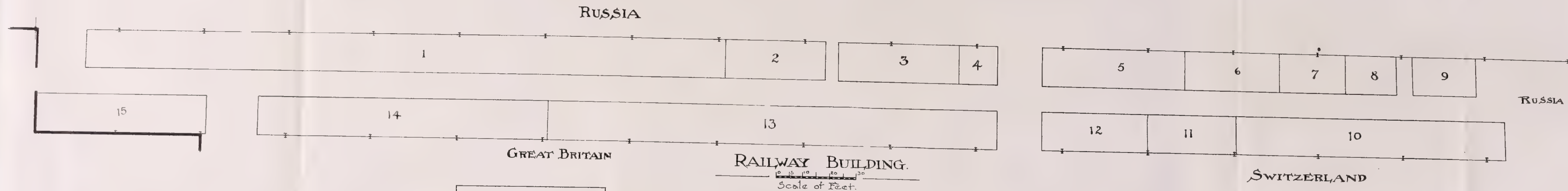
1823A

PLAN OF THE WALL
PALACE OF CIVIL ENGINEERS

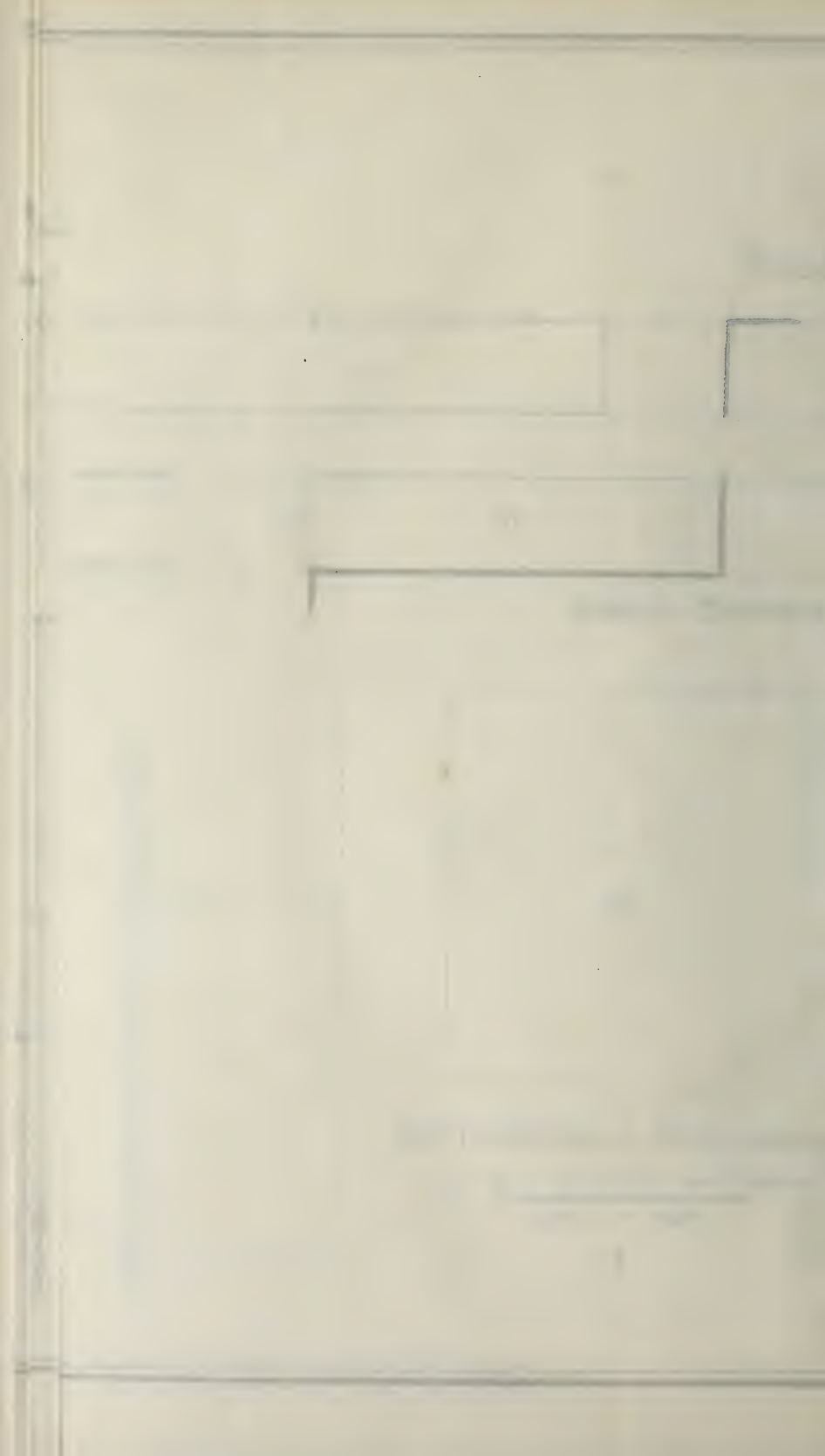


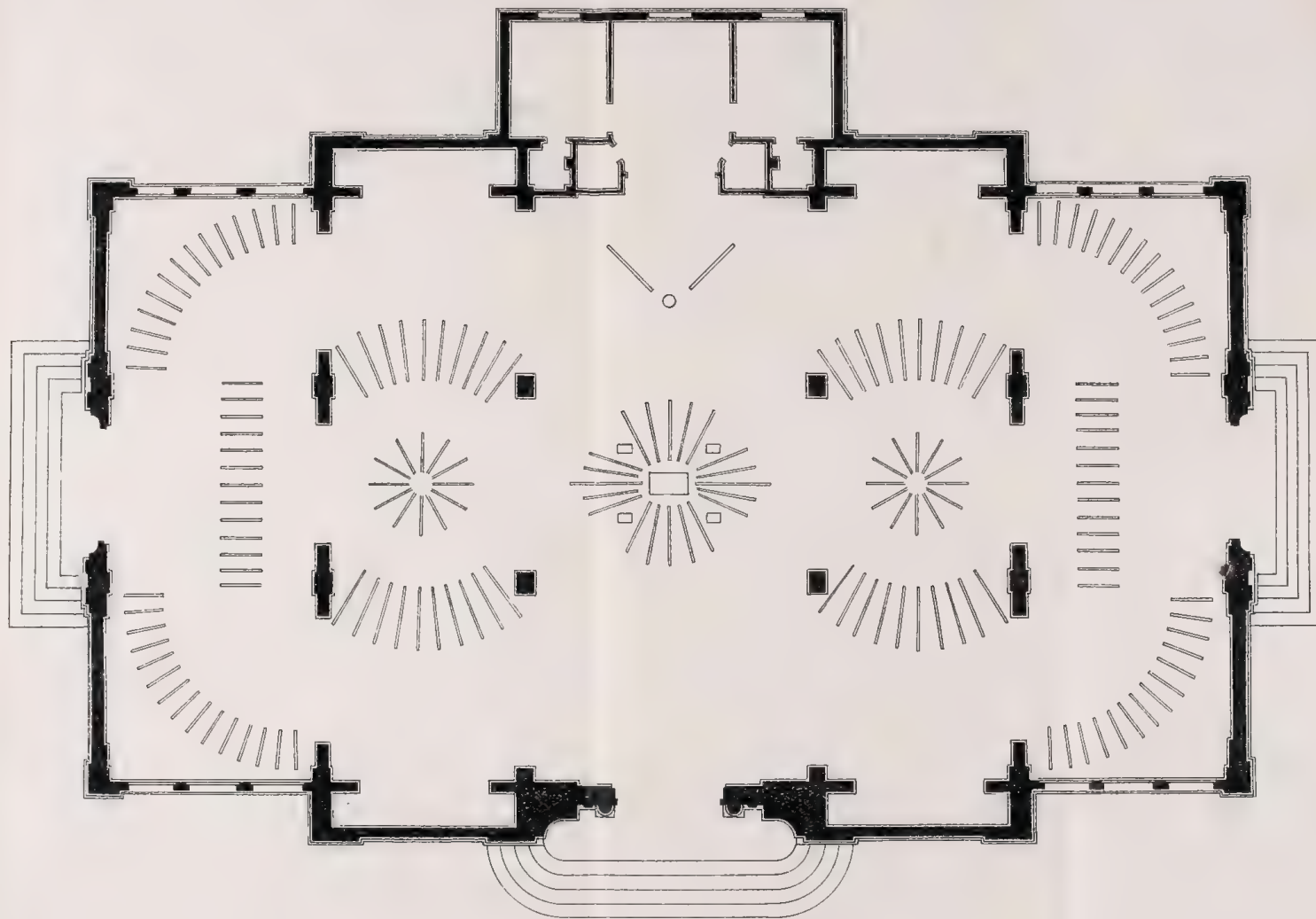


This design
 made by the
 inventor
 and is the
 property of the
 inventor



PARIS EXPOSITION OF 1900.
 PLAN OF INSTALLATION IN UNITED STATES SPACE,
 IN AUTOMOBILE, AND RAILWAY BUILDINGS.
 GROUP VI
 VINCENNES.

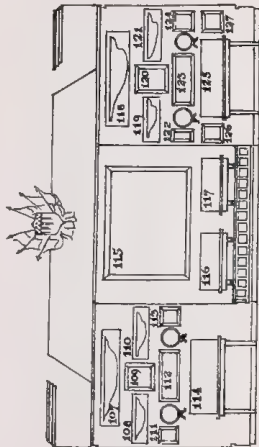




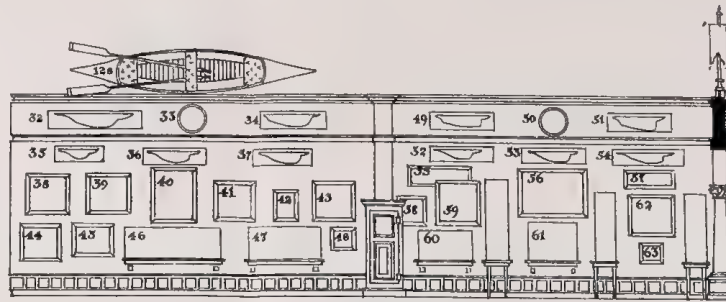
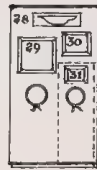
PARIS EXPOSITION OF 1900
PLAN OF INSTALLATION IN UNITED STATES BICYCLE ANNEX
AT VINCENNES
GROUP VI

0 5 10 15
SCALE OF FEET



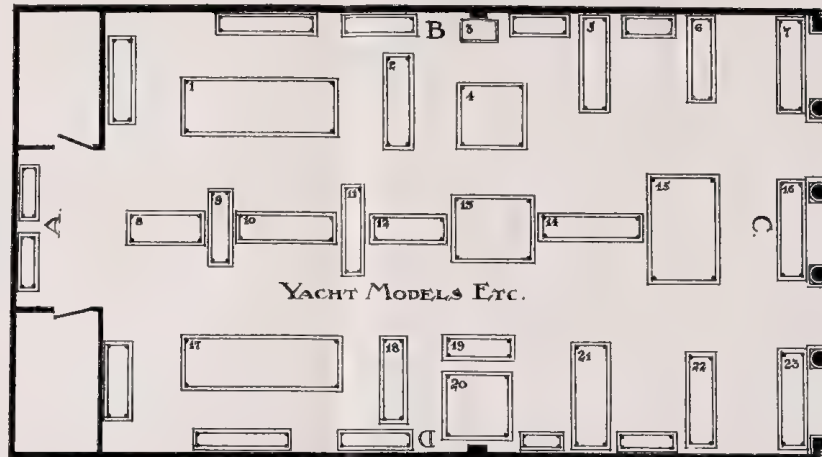


ELEVATION A.

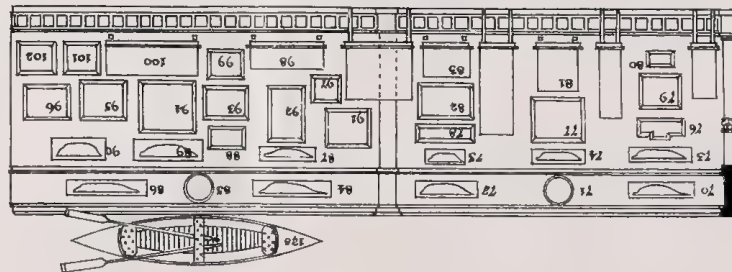
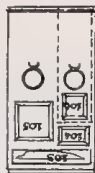
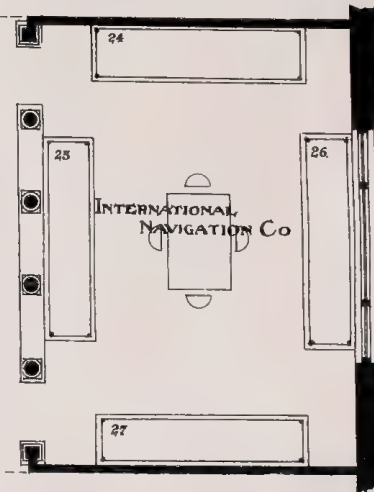


ELEVATION B

ELEVATION C.



MAIN AISLE OF PALACE.



ELEVATION D.

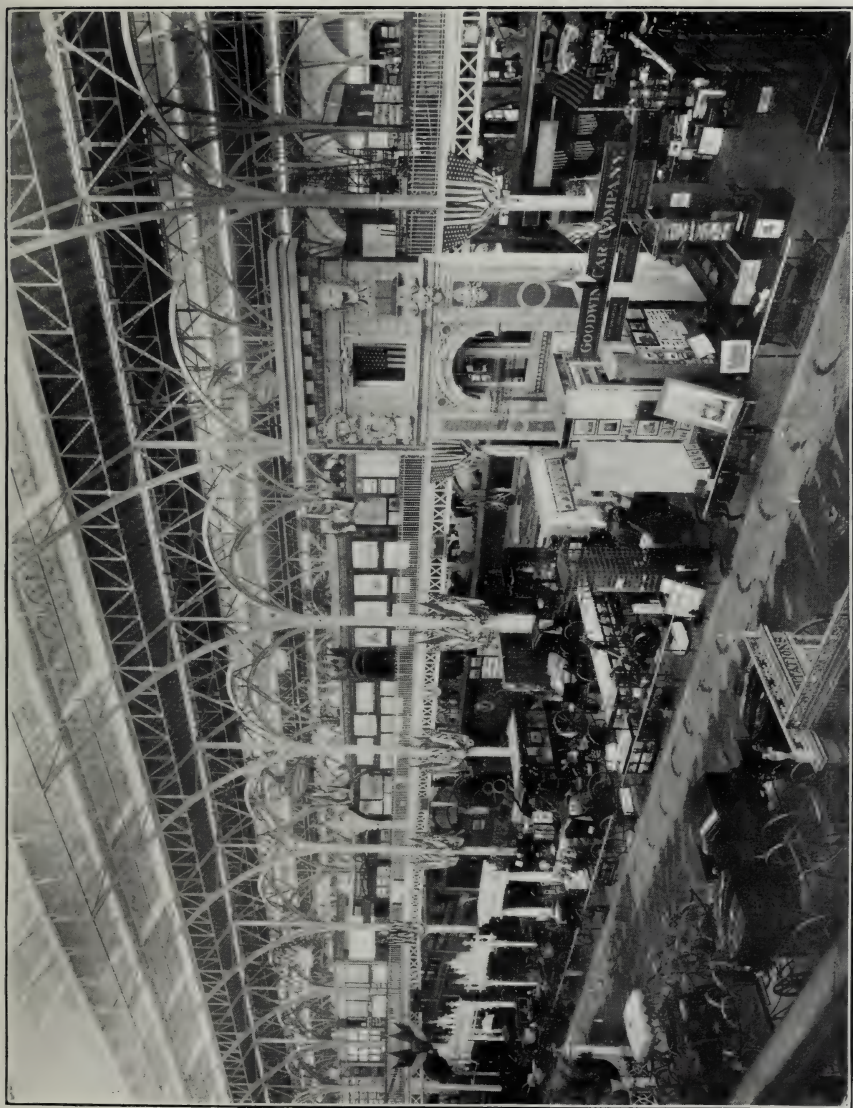
PARIS EXPOSITION OF 1900.
PLAN OF INSTALLATION
IN UNITED STATES SPACE
IN PALACE OF COMMERCIAL NAVIGATION.

CLASS 33.
SCALE IN FEET.

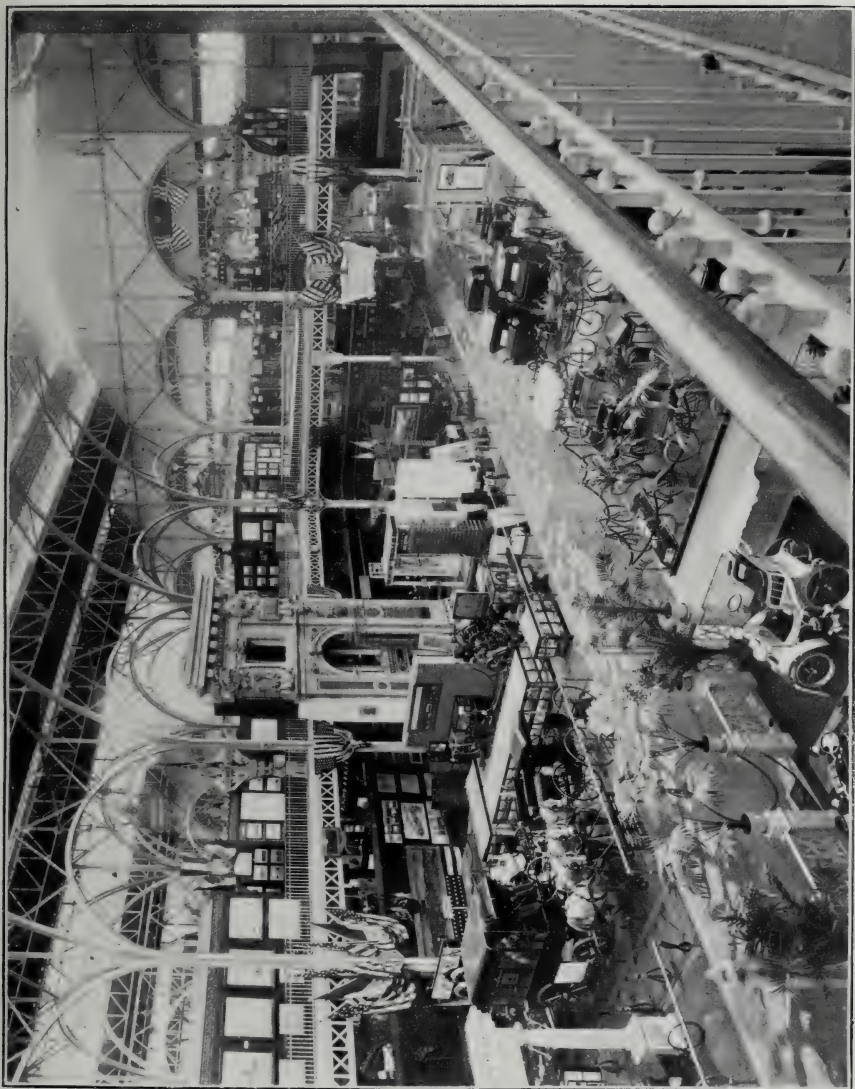


32. Pampa (half model).
33. Large red seal.
34. Aloha (half model).
35. Liris (half model).
36. S. S. yacht Utowana (model).
37. Nymph (half model).
38. Marguerite (photograph, colored).
39. Rosalind and Beetle (photograph, colored).
40. Columbia and Shamrock (photograph).
41. Alcaed (photograph, colored).
42. A rapp full (photograph).
43. New York Yacht Club, fleet at Pollock Rip (photograph).
44. Shamrock crossing the line (photograph).
45. Marguerite (photograph).
46. S. S. Colgate Hoyt (model).
47. Twin-screw steam yacht Pocahontas (model).
48. Close hauled (photograph, colored).
49. Ingomar (half model).
50. A red seal of New York Yacht Club.
51. Navaho (half model).
52. Quick Step (half model).
53. No name (half model).
54. Katrina (half model).
55. Sailing a cup defender (photograph).
56. A marine oil painting.
57. Emerald (photograph).
58. Columbia and Defender (photograph).
59. Columbia crossing the line (photograph).
60. Presto (model).
61. Auxiliary yacht Intrepid.
62. Corsair (photograph).
63. Columbia and Shamrock maneuvering (photograph).
64. Audox (half model).
65. Red seal of Atlantic Yacht Club.
66. Mira (half model).
67. Katonah (half model).
68. Red seal of Corinthian Yacht Club.
69. Ethelwynn (half model).
70. Latona (half model).
71. Red seal of Larchmont Yacht Club.
72. Emerald (half model).
73. Yitania (half model).
74. Columbia (half model).
75. Ariole (half model).
76. America, cup race, 1899 (photograph).
77. The Columbia (painting).
78. Cup defender (photograph).
79. Shamrock (photograph).
80. Cup race view, 1899 (photograph).
81. Narota (model).
82. Cup defender (photograph).
83. Utopia (model).
84. Sea Fox (half model).
85. Red seal of Eastern Yacht Club.

86. Hildegard (half model).
87. Iroquois (half model).
88. Larchmont Yacht Club (photograph).
89. Lyce (half model).
90. Gossoon (half model).
91. Columbia (photograph).
92. Puritan (photograph).
93. Shamrock (photograph).
94. Chart of America's cup race.
95. Columbia (photograph).
96. Shamrock (photograph).
97. Larchmont Yacht Club (photograph).
98. Fox (model).
99. Wasp (photograph).
100. Whaleback steamer Buffalo (model).
101. Shamrock and Columbia (photograph).
102. Shamrock crossing the line (photograph).
103. Niagara (half model).
104. A piping breeze (photograph).
105. Columbia crossing the line (photograph).
106. Reading in a light air (photograph).
107. Corsair III (half model).
108. Gloriana (half model).
109. Amorita (photograph).
110. Wasp (half model).
111. Luffing match (photograph).
112. For the Columbia cup (photograph).
113. A stiff northwester (photograph).
114. Whaleback No. 137.
115. A marine oil painting.
116. Ellide (model).
117. Steam launch Viper (model).
118. Eleanor (model).
119. Uncas (half model).
120. Columbia (photograph).
121. No name (half model).
122. A hard puff (photographic view).
123. Sachem, Dogmer, etc. (photograph).
124. Heading for the line (photograph).
125. Frank Rockefeller (whaleback model).
126. New York Yacht Club station (photograph).
127. The handicap signal (photograph).



E-1. VIEW OF EXHIBIT ON GROUND FLOOR OF PALACE OF CIVIL ENGINEERING AND TRANSPORTATION, INCLUDING ENGINEERING MODELS, AUTOMOBILES, ETC.



E-2. GENERAL VIEW OF UNITED STATES INSTALLATION, GROUND FLOOR, PALACE OF CIVIL ENGINEERING AND TRANSPORTATION, GROUP VI, CHAMP DE MARS.

DIRECTOR'S NARRATIVE.

DEAR SIR: The department of civil engineering and transportation embraced the classes from 28 to 34, inclusive, of Group VI. In classification it was modeled after the department of transportation exhibits of the World's Columbian Exposition of 1893, and was intended to cover all modes of transportation by land and sea. It, however, covered more explicitly than the classification of 1893 the subject of civil engineering, which is so closely identified with transportation as to be almost inseparable for exhibition purposes, while at the same time including many branches only remotely related to transportation, if at all. The idea of a department of this kind has proved popular and instructive, although at first glance the association of such articles as saddlery, balloons, and locomotives seems incongruous and unreasonable.

The department was organized by my appointment as director, made December 7, 1898, and taking effect December 16, 1898. I began active work at the last-named date. Lieut. Commander Asher Carter Baker, of the United States Navy, having been detailed by the Secretary of the Navy to assist the Commissioner-General, was assigned this department as assistant director, a position which he filled efficiently until the final close of the work of the department. As the work of the department increased, it became necessary to have an assistant in special charge of the engineering section. George S. Wilkins, C. E., was appointed expert, and began his services as such June 20, 1899.

When the department was organized there were found to be only a few formal applications for space in hand. Vigorous correspondence was undertaken and many personal visits made to desirable exhibitors in all parts of the country, and addresses were made before various technical societies. The demands for space became so numerous and large, in some classes, as to amount to three times the space available. In other classes more promotion was necessary, and in some it became evident that the exhibits, if made, must be created by the department and at the expense of the Commission. The director deemed it his duty to secure, for the credit of the country, as complete and representative a showing as possible in all classes. In civil engineering and in merchant marine it is, as a rule, difficult to find sufficient motive

for private exhibitors. Societies and associations must be visited and public spirit aroused. When this is done it is still necessary, for the proper illustration of great public works, that the Government shall provide the money for making models and photographs and for transporting, installing, and caring for the same. Conditions of this kind were met in a liberal spirit by the Commissioner-General, who did not hesitate to devote the necessary funds to such objects when satisfied that all possible contributions had been obtained from other sources.

In order to accommodate a large number of small exhibitors whose products were of the most desirable kind, but who, on account of the limited space which could be accorded them, and the relatively high cost of exhibiting independently were deterred from the attempt, a plan for collective exhibits was matured and successfully carried into execution. Under this plan the department agreed to accept the articles to be exhibited at New York, to transport them to Paris, install and care for them, provide a professional attendant to explain them to the public and properly represent them to the juries of award, and finally to return the articles to the owners, having rendered practically all the service which an exhibitor could do for himself personally.

The expenses were carefully estimated and apportioned on the basis of the number of square feet occupied. A number of exhibitors availed themselves of this plan and secured satisfactory representation at very small cost. The money paid in was placed in the hands of a trustee, and the expenditure was carefully accounted for.

In order to get a thorough understanding of the spaces allotted to the department and to avoid serious errors, the director made a brief visit to Paris in the summer of 1899. The spaces originally allotted and subsequently obtained as the result of persistent negotiation were in seven different locations. The difficulties of arranging and installing the exhibit were greatly augmented by this fact. Had it been possible to secure all of the space of the department in one building, the expense and difficulties would have been much less, and the effect would have been much more impressive and satisfactory. Three of these sections were located at the Bois de Vincennes, 7 miles distant from the others.

	Total area, including obligatory aisles.	Net exhibit space.	Circula- tion.	Net floor space covered.	Wall space.
Ground floor, palace of civil engineering and transportation, Champ de Mars	10, 170	8, 670	1, 400	7, 270	2, 000
Gallery floor, palace of civil engineering and transportation, Champ de Mars	7, 553	5, 166	500	4, 666	3, 500
Palace of commerce and navigation	3, 185	2, 518	1, 259	1, 259	1, 536
Marine annex (post-office exhibit)	1, 660	1, 660	830	830	1, 116
Bicycle building, Bois de Vincennes	6, 386	4, 992	3, 392	1, 600	3, 200
Railroad building, Bois de Vincennes	21, 760	15, 360	300	15, 060	1, 000
Automobile building, Bois de Vincennes	7, 500	5, 875	4, 475	1, 400	364
Total	58, 214	44, 241	12, 156	32, 085	12, 716

The final allotment of space to exhibitors was delayed as long as possible, in order to avoid the necessity of readjustment owing to inevitable withdrawals. The wisdom of this course became apparent when final allotment became necessary. The year 1899 was a most unfortunate one, from an exposition standpoint, owing to the extraordinary prosperity and the tremendous pressure upon manufacturers not merely to meet new orders, but to take care of old customers. The formation of trusts and other combinations was another cause of many withdrawals. These causes resulted in the final withdrawal of two-thirds of the applicants—not in number, but in amount of space. Under these extraordinary conditions it is a matter of congratulation that all of the space of the department was occupied by exhibits of a creditable character and that there was none wasted or which could have been spared.

The plans of each section, with the key thereto, show how the space was finally occupied and that the greatest economy in its distribution was required.

There were exhibits in every class except 34, aerial navigation. In this class the United States apparently had nothing worth showing.

Allotments of space by classes.

Group VI:		Number of exhibitors.
Class 28.....		22
Class 29.....		88
Class 30.....		44
Class 31.....		4
Class 32.....		149
Class 33.....		133
Total.....		440

This included the individual exhibitors in the collective exhibits, such as "collective engineering," yachting, and the library. It does not, however, include all of the photographs and drawings of engineering work, civil and mechanical, of which there were some 2,000. This important collection was presented to the leading engineering societies and technical schools of Paris at the close of the Exposition.

The staff of the department departed for Paris January 31, 1900, with the exception of the director, who remained at the Chicago offices in charge of the affairs of the Commission in this country until May 1, 1900, when he proceeded to Paris. The immediate work of installation was, therefore, in charge of the assistant, plans for the location of each exhibit having been made in advance. Owing to the character of the exhibits in this department, façades or other ornamental inclosures were not used. Spaces were separated from the aisles and from each other by brass railings and ornamental cords. The floors were generally covered by linoleum or carpet. An exception was made in the palace of commerce and navigation, where the collective yachting exhibit and the American Line exhibit were separated from the main

aisle by highly artistic façades. For decoration, dependence was placed principally upon flags and shields artistically draped and arranged by the director of decoration.

The usual difficulties of installation were greatly augmented by the incomplete state of the buildings at the time when they were supposed to be ready for exhibits. The chaotic condition prevailing for weeks immediately preceding and following the opening of the Exposition is doubtless fully dealt with in other reports. The following brief statement by the assistant director of this department gives some faint idea of it:

In the way of installation we encountered what seemed almost insurmountable difficulties. It was almost impossible to get our cars. The yards at Batignolles were congested, and the yard master, being unaccustomed to handle so much freight, quite lost his head. There was absolutely no flexibility to the system. Everywhere we received the utmost politeness and courtesy, but no results. The difficulties were caused principally from the lack of room in the yards and in the Champ de Mars. Most of the delay in the United States section was caused by the unloading and reloading at Havre. The dock at one time, for at least a mile, was piled with freight, most of it for the United States section of the Exposition. The workmen on the docks were very indifferent, and progress was slow. The steamers were unloaded and the goods assorted according to the manifest. Frequently the description of the boxes on the manifest were so incomplete that recognition was impossible. Again, the manifests were full of errors, and goods billed for one steamer came on the next. At one time there were seven steamers unloading simultaneously, all having United States Exposition goods as part of the cargo. No goods could be touched on the docks until the manifest was checked and the steamer cleared. The sorting of the boxes and machinery in groups took some time. The declarations made in America were frequently so late that the customs papers had to be made out without them from the boxes themselves. The papers for the customs and the waybills were all made in triplicate by hand, and the dock clerks worked sixteen hours a day trying to get the loaded cars forward. Once started from Havre, they were often found at Mantes and Acheres, as the yards at Batignolles and Champ de Mars were congested. Only a portion of the cars for Group VI were delivered on the space. Our boxes were found exposed on the Champ de Mars and in various localities in the buildings. Desperate measures had to be taken to secure the boxes. Men had to be hired on the spot to transport them, or they would be lost. The United States goods were not loaded on the cars according to groups or localities. Anything belonging to the United States was loaded in a car until it was full. The result was great confusion. Boxes for Vincennes were dumped on the Champ de Mars, and vice versa. It was most difficult to obtain material and labor at any price. The members of the staff in charge of installation had no way of coming directly and immediately in contact with the French Exposition authorities. In the buildings themselves there were no French officials or engineers to give information or orders. Everything was centralized at No. 2 Avenue Rapp, and complaints had to be taken up by correspondence. Consequently there was an enormous loss of time. It is clear that accurate records of cars and boxes were impossible.

Loan exhibits, including all those furnished by the United States Government, purchased by the Commission or borrowed, were, as far as possible, shipped to Paris on the Government transport *Prairie*. They were also returned in the same manner. Private exhibitors, of course, attended to their own shipments, both going and coming, and

to their installation. They, however, needed and secured the constant assistance of this department. After the close of the Exposition the members of the staff remained in Paris until all articles for which the department was responsible were safely packed and shipped. So far as is known at this writing, there have been no losses and no damages which were not quickly repaired.

The director, assistant director, and expert all acted as members of the jury of awards. The arduous jury duties extended through many weeks and required not only close application, but careful management, to secure the best results possible for American exhibitors. The results in the shape of awards were very gratifying, and have been so satisfactory to exhibitors that there has not, to my knowledge, been a single complaint.

The number of awards in each class, Group VI, were as follows:

EXHIBITORS.

	Number of exhibitors.	Hors concours.	Grand prize.	Gold medal.	Silver medal.	Bronze medal.	Honorable mention.	Total awards.
Class 28	22		3		4			7
Class 29	88	3	7	15	2		2	29
Class 30	44	1	1	7	8	7	7	31
Class 31	4				4	1		5
Class 32	147	1	5	8	15	7		36
Class 33	133		1	4	11		2	18
Total	438	5	17	34	44	15	11	126

COLLABORATEURS.

	Gold medal.	Silver medal.	Bronze medal.	Honorable mention.	Total awards.
Class 28	4	5			9
Class 29	32		9	12	53
Class 30	4	3			7
Class 32	5	4	1		10
Class 33	2				2
Total	47	12	10	12	81

Total awards to exhibitors and collaborateurs were as follows:

	Hors concours.	Grand prix.	Gold medal.	Silver medal.	Bronze medal.	Honorable mention.	Total awards.
Class 28		3	4	9			16
Class 29	3	7	47	2	12	14	85
Class 30	1	1	11	11	7	7	38
Class 31				4	1		5
Class 32	1	5	13	19	8		46
Class 33		1	6	11		2	20
Total	5	17	81	56	28	23	210

The director of the department was also a delegate to three Congresses, viz, on the testing of materials, on tramways, and the international railway congress.

THE EXHIBITS.

Classes 28 and 29.—Group VI comprised seven classes intended to cover the entire field of transportation and of civil engineering. Classes 28 and 29 covered the entire engineering classification, the former embracing “materials, equipment, and processes relating to civil engineering,” and the latter “models, plans, and designs for public work.” An exhibit of this nature relating rather to professional interests than those of a direct commercial character must be sought for and prepared with considerable care and expense. It can not be said to yield much direct returns to those participating, but is rather of an educational value. At the same time, if it is of a creditable character, nothing tends more to elevate the standing of a country among the nations of the earth and to increase respect for its ability and resources.

The magnitude of great engineering works makes representation possible only in models, drawings, photographs, etc. It was decided to attempt to illustrate on a fair scale a few of the most prominent features of recent American engineering. These were the Chicago Drainage Canal, representing the most important engineering work of the decade; the work of the Mississippi River Commission, showing the most recent and successful methods of controlling and improving great rivers; the steel frame method of constructing high buildings in the United States; municipal engineering as illustrated by a mammoth map of Greater New York; and the public works exhibits of the State of Massachusetts. Each of these leading exhibits is described below. In addition to these the State of California sent a relief map of the State, another of the Yosemite Valley, and one illustrating long distance transmission of electrical power. The Chicago, Milwaukee and St. Paul Railroad furnished an excellent model of the standard Howe truss bridge which has been such an important factor in the construction of the American railway system. The Illinois Central Railroad furnished a model of a ballasted trestle, an interesting novelty which originated on that road. The Kansas City, Fort Scott and Memphis Railroad Company sent an excellent model of the steel bridge over the Mississippi River at Memphis, Tenn. Mr. George A. Morrison, C. E., the engineer of the great structure, also exhibited detailed drawings of it, of great technical value.

There were collected also by this department a series of some 2,000 photographs, representing recent work in civil and mechanical engineering in the United States. As far as possible, these were exhibited on walls and in albums. Engineering literature was represented by bound volumes and current files of the technical periodicals, the proceedings of engineering and technical societies. At the close of the Exposition the most of these photographs and publications and some of the models were presented to the principal engineering schools of Paris.



E-4. MAP OF THE CITY OF NEW YORK; IN GALLERY OF PALACE OF CIVIL ENGINEERING AND TRANSPORTATION.

As illustrating the plans and installation of large manufacturing plants from an engineering point of view, there was shown a model of the Deering Harvester Works, of Chicago. This model was 18 feet long by 5 feet high and 3 feet deep. It was beautifully wrought in metals, with electric lights shining from its thousands of windows, the glare of the foundries being represented by red lights: Smoke poured from its numerous chimneys, and the perspective was such as to lead the many immense buildings back in panoramic effect into the far distance. Railroad tracks in the foreground and boats on the river at the rear, in exact representation of everyday scenes at the Deering works, gave to this exhibit a semblance of reality that attracted much attention from visitors, particularly Europeans.

EXHIBIT OF TOPOGRAPHICAL MODELS OF THE CHICAGO DRAINAGE CANAL.

One of the most important engineering works of the latter part of the century is the Chicago Drainage Canal. The commission having this work in charge consists of 9 trustees, and the organization is known as the Sanitary District of Chicago. At my request, the trustees undertook to prepare complete relief maps and models illustrating the entire work. These were transported to Paris at the expense of the Government and were installed in a prominent place on the main floor of the palace of civil engineering and transportation. Every phase of the work was shown as graphically as possible, including every variety of excavation, and the great controlling works. The models were surrounded by a large collection of photographs illustrating graphically the construction of the canal by the great variety of ingenious modern machinery. In close proximity were shown models of steam shovels and hydraulic dredges and several exhibits of rock-drilling tools.

This exhibit was justly considered one of the most interesting engineering features of the Exposition. It was constantly visited and studied by engineers, who availed themselves of the explanation of the engineer in attendance. The importance of this work is so great that I have secured from the chief engineer, Mr. Isham Randolph, the following succinct description of it:

THE SANITARY DISTRICT OF CHICAGO, SECURITY BUILDING,

Chicago, November 30, 1900.

DEAR SIR: I have the honor to submit the following report in relation to the work of the Sanitary District of Chicago, a relief map and models of which were exhibited in the department of the Universal Exposition at Paris of 1900 which was under your charge.

Lake Michigan has been the reservoir from whence Chicago has drawn its water supply ever since she outgrew the resources of the town pump. That lake has also been the receptacle of its sewage ever since the city attained a size which made sewers necessary adjuncts of its growth. This combination use of the lake was repulsive to all ideas of cleanliness and health and the disgust and agitation of years culminated in the passage by the legislature of the State of Illinois of the sanitary district law of 1889. Under this law the Sanitary District of Chicago was organized

and the work of creating a channel which would reverse the flow of the Chicago River and cause it to draw water from Lake Michigan and discharge it into the Desplaines River, 34 miles southwest of the point where the Chicago River connects with the lake was commenced. This work is accomplished; Lake Michigan is no longer defiled by foul discharges from the river, and Chicago has an exhaustless supply of pure water.

The new channel connects with the old river at Robey street in the city of Chicago. The length of this channel proper is 28.05 miles, ending at the controlling works near Lockport, in Will County. The first division of the work, from Robey street to Summit, 7.8 miles, is through clay and this stretch has not been excavated to the full cross section proposed for the work, but it is 110 feet wide at the bottom, with side slopes of 2 feet horizontal to 1 vertical, giving a resulting width at water line, with the minimum depth of 22 feet of flowing water, of 198 feet.

The second division is through glacial drift from Summit to Willow Springs, a distance of 5.3 miles. This division has a cross section of 202 feet on the bottom, with side slopes of 2 feet horizontal to 1 foot vertical, giving a surface width of 290 feet with the minimum depth of 22 feet of water flowing. The gradient used for the 13.1 miles just described is 1 foot in 40,000, or approximately $1\frac{5}{8}$ inches per mile.

At Willow Springs solid rock is encountered, and from that point to the end of the channel at Lockport, a distance of 14.95 miles, the standard cross section is 160 feet wide on the bottom, sides carried up vertically with two offsets on each side of 6 inches each, giving a resulting surface width of 162 feet. For about 7 miles the channel is in thorough rock cutting, and along the rest of the distance massive walls of masonry have been reared on the underlying rock. The gradient in rock is 1 foot in 20,000 feet, or approximately $3\frac{1}{4}$ inches per mile.

The controlling works at the end of the channel consist of one bear-trap dam 160 feet long, capable of oscillating through a range of 17 feet; seven lifting gates, each having an opening of 32 feet, and spaces provided for eight additional gates, should they ever be needed. All of these devices are of massive and durable construction. The location of these works was planned with a view to the future extension of the main channel as a navigable waterway.

The main channel is spanned by thirteen bridges, six of which are for public highways and seven for railway traffic. Of these latter one carries eight railroad tracks, one carries four tracks, and the remaining five two tracks each. The eight-track bridge is a bascule bridge of the Scherzer type; all of the others are swing bridges. Those spanning the earth channel have center piers, but in the rock channel there is no obstruction, as all of the pivot piers are built on the right bank and one arm of the bridge spans the entire channel. Every interest of navigation has been carefully considered and conserved in the planning and executing of the work.

From Lockport to the upper basin at Joliet the declivity of the valley is about 30 feet (deduced from the original surface at controlling works to water surface in upper basin), and the distance of $4\frac{1}{4}$ miles. The Sanitary District diverted the course of the Desplaines River below the controlling works for a distance of about 5,400 feet, providing for it a straight and wide but shallow channel, the left or easterly bank of which is carried up as a levee to a height well above any possible flood surface. From the Wire Mills road, at the end of the shallow channel just described, to a point about 12,000 feet farther downstream, the district has done no construction work, as it was cheaper to flood the lands which it had acquired than to excavate a channel capable of confining the waters within narrow bounds. The flooding policy had to be abandoned just south of the point where the Elgin, Joliet and Eastern Railroad crosses the river, and from there on a channel has been excavated for a distance of 5,000 feet, to a junction with the upper basin (formed by Dam No. 1) in Joliet. The distance from the confluence of the new channel just described to Dam No. 1 is about 2,300 feet. This basin has been dredged to give a cross section suffi-

cient to pass the combined flow from the sanitary channel and the maximum flood of the Desplaines River. Below Dam No. 1 the Desplaines River has been widened to 200 feet; Dam No. 2 and the Adams Dam have been entirely removed, and the sides have been protected either by concrete retaining walls or massive levees. The work of the Sanitary District ends at Hickory Creek, 9,600 feet below Dam No. 1.

But the work and expenditures of the Sanitary District have not been limited to the main channel and the Desplaines River. The Chicago River has come within the scope of its plans, that river which connects Lake Michigan with the main channel has already been given a navigable depth of 20 feet below a line sloping from datum at Lake street to minus 2.5 at Robey street, a distance of 5.6 miles. The tunnels, however, prevent the use of this stretch of channel by vessels drawing over 17 feet. Provision for flow has been made by widening at many contracted places and by constructing a by-pass between Adams and Van Buren streets. Plans for progressive improvements of this river by deepening, widening, and removing center pier bridges and substituting therefor bridges of the bascule type have been adopted by the board of trustees of the Sanitary District. Two of these bascule bridges are now under construction and the district is committed to the construction of seven more. The benefits of these improvements, which are to cost many million dollars, are incalculable to the shipping interests of the Great Lakes.

Having given this brief but comprehensive description of the work of the Sanitary District, it is proper to give a few statistics showing its magnitude and cost. The volume of excavation foots up 43,736,370 cubic yards, divided as follows:

	Glacial drift.	Solid rock.
	<i>Cubic yards.</i>	<i>Cubic yards.</i>
Chicago River, from Lake street to Robey street.....	1,382,965	
Main channel from Robey street to Lockport.....	26,887,347	12,276,026
Lockport to Hickory Creek.....	558,172	571,871
River diversion.....	1,801,339	258,659
Total.....	30,629,823	13,106,556

The volume of the retaining walls constructed foots up 388,405 cubic yards. The average cost of glacial drift excavation on which prices ranged from 10 cents minimum to 50 cents maximum, was 28.29 cents per cubic yard. On solid rock the prices ranged from 59 cents up to 95 cents per cubic yard, and the average cost was 74.99 cents. On retaining wall the prices ranged from \$2.74 up to \$4.05 per cubic yard, and the average price was \$3.29 per cubic yard.

The total expenditures of the work of the sanitary district up to October 1, 1900, is as follows:

Construction.....	\$21,909,504.22
Bridges.....	2,425,012.05
Right of way.....	3,187,940.46
Engineering and administration.....	2,907,896.52
Capitalization and maintenance of bridges.....	282,196.20
Maintenance account.....	157,622.38
Interest charges, net.....	3,389,072.38
Total.....	34,269,244.51

The economies shown in the construction of this great work were made possible by the use of improved machinery, nearly all of which came from the inventor in response to the needs of this enterprise, and those machines which were in use prior to their employment here underwent a fuller development and were brought to a higher stage of perfection to meet the harder requirements imposed upon them in this widest field of usefulness to which they had ever been called. The great volume

of the work justified the enormous investment in mechanical appliances. Estimates on the cost of constructing work like this and its extension, based upon precedents in force prior to the beginning of the last decade, must be revised and scaled down, and the engineer must reckon on the use of hydraulic dredges for alluvial deposit, monster steam shovels for digging glacial drift, channeling machines for the sides of rock channels, drills driven by compressed air, and dynamite to complete their work; cableways, cantilever cranes, inclined hoists for removing the excavated materials, and the whole retinue of minor devices used to cheapen and expedite the work.

Very truly, yours,

ISHAM RANDOLPH, *Chief Engineer.*

WILLARD A. SMITH, Esq.,

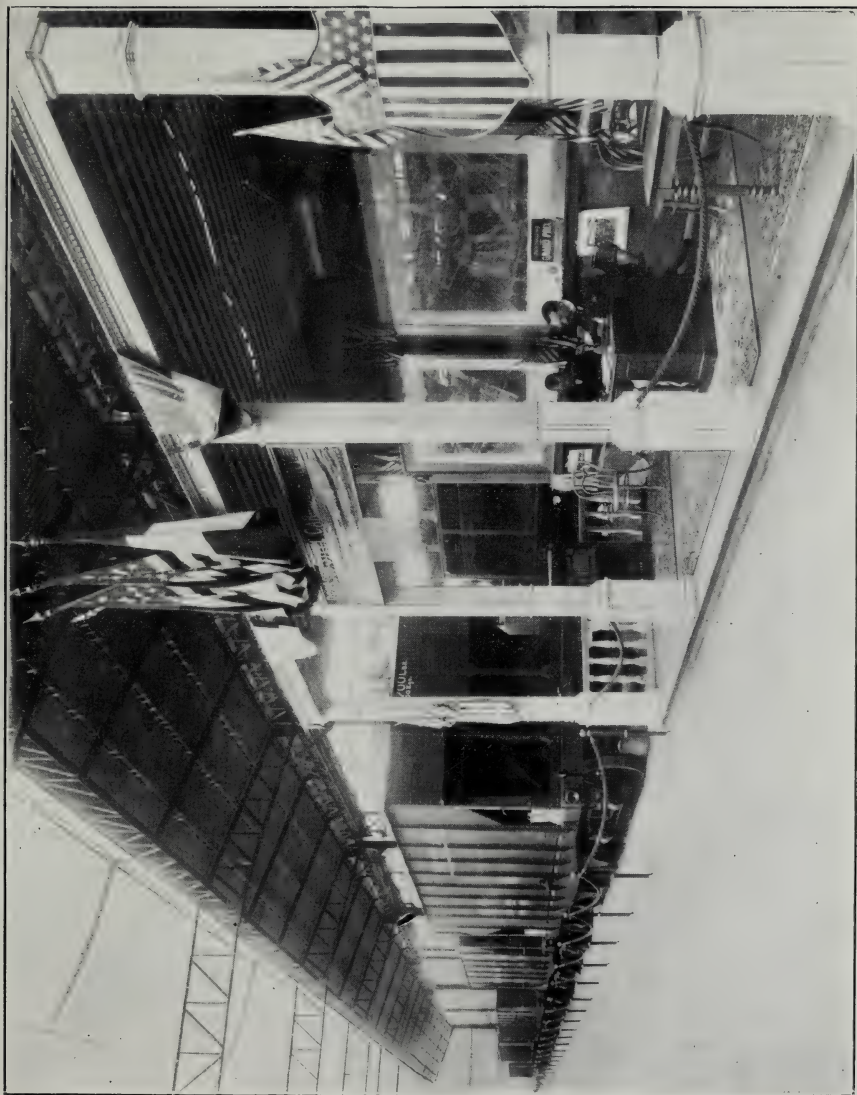
Director of Civil Engineering and Transportation.

WORKS FOR THE IMPROVEMENT OF THE MISSISSIPPI RIVER ILLUSTRATED AT THE PARIS EXPOSITION OF 1900.

Among the many interesting exhibits in the civil-engineering group none attracted more interest among engineers than the models, drawings, and maps of the various works connected with the improvement of the Mississippi River. This work is carried on under the direction of a commission of seven distinguished engineers appointed by the President of the United States. Nearly \$2,500,000 is expended each year on the lower half of the river, between the mouth of the Ohio River and the Gulf of Mexico. The work consists of two classes—one, the improvement of low-water navigation, and the other, the regulation and control of floods. The magnitude of the stream makes both phases of the problem extremely difficult and the methods employed are correspondingly interesting.

The exhibits were prepared under the supervision of Col. J. A. Ockerson, a member of the Mississippi River Commission, who has spent many years on the great river and is doubtless the highest authority on the intricate questions pertaining to its improvement.

The models relating to the improvement of low-water navigation consist of a hydraulic dredge of large capacity, hydraulic pile sinker, and hydraulic grader. The dredge is an expedient for the temporary relief of low-water navigation which must be repeated each year while the permanent improvement of the stream is pending. The obstructions to low-water navigation consist of sand bars extending across the channel between the pools of deep water. There are about 35 of these bars below the mouth of the Ohio River, and they range from 400 to 1,600 meters in length. They develop rapidly as the water falls, and the dredges are employed to cut a channel through them. The type of dredge used is the result of several years of experiments conducted by the commission to ascertain whether temporary expedients were practicable and also the best methods to employ to obtain the desired results. The model shown was one of the latest type of dredges. It has propelling engines and side wheels. The pump has a runner about $2\frac{1}{8}$ meters in diameter, which is run at the rate of 150 revolutions per



E-7. STEEL CARS IN RAILROAD BUILDING AT BOIS DE VINCENNES.



E-8. EXHIBITS OF CAR COUPLINGS AND SIGNALING APPARATUS IN RAILROAD BUILDING, BOIS DE VINCENNES.

minute. The length of suction admits of dredging to a depth of about 6 meters. The pump is the double-suction type, admitting the water each side of pump casing, the suction being in two parts, which can be raised and lowered separately. The material is discharged through a floating pipe 87 centimeters in diameter and 307 meters long. This discharge pipe is floated on pontoons which can be set at any desired angle with the current and the pipe line can thus be deflected and the material delivered well out of the channel, or even out on the banks if so desired. The dredge is moved along the desired line of cut by means of two cables attached to hollow iron piles set firmly in the sand, the dredge ends of the cables being attached to powerful hauling winches. In making the cut the dredge is generally moved upstream the full length of the cables, or about 375 meters. When a cut has been finished the dredge is dropped down the length of the cables and another cut is made parallel to the first one. This operation is repeated until the required width has been attained.

The depth of cut ranges from 1 to 2 meters, and the rate of movement along the cut varies from 20 to 60 meters per hour, according to the depth of the material. The dredge has a working capacity of about 100 cubic meters per hour. The dredges are equipped with a full line of machine-shop tools, by means of which repairs can be made with facility. They are lighted throughout by electricity, and have ample cabins, well arranged for the comfort of officers and crew. A refrigerating plant is also provided. The model shows the dredge complete, with its machinery, boilers, and other details worked out in an admirable way. During the low-water season of 1899 a navigation depth of $2\frac{1}{2}$ meters was maintained by dredging where under natural conditions the depths are sometimes as low as $1\frac{1}{2}$ meters. The commission now has seven hydraulic dredges in service and two others are under construction.

The hydraulic piles are hollow steel tubes 0.25 meter in diameter and $10\frac{1}{4}$ meters in length. They are provided with hose connections at one end, and are very quickly set and withdrawn by means of water pressure from a pump on the pile sinker. They are generally sunk in the sand to a depth of about 4 or 5 meters, the shackle to which the dredge cables are attached being near the surface of the same. They hold much better than anchors and are quite as easily set.

The hydraulic grader is used to grade down the caving banks prior to paving with stone to prevent erosion. These graders usually have several lines of hose which may be operated at the same time. The nozzles are 0.045 meter in diameter and the pressure is about 110 pounds per square inch. They are very effective and economical in the work of grading banks. A large model shows very clearly the operation of grading, as well as the types of grader used.

Bank erosion reaches enormous proportions on the lower Mississippi

River. From 1882 to 1892 the average annual rate of erosion amounted to 9 acres for each mile of river. This erosion not only furnishes most of the material which forms the bars that obstruct navigation, but is also the active agent in the destruction of levees. Even cities are often attacked and valuable buildings and property are carried away.

The character of caving banks and methods employed to prevent erosion were well shown in three large models made on a scale of 1 to 50. One model, which is worked out in much detail from actual surveys, shows a typical caving bank along which a fascine mat of willows is being woven. These mats are from 76 to 91 meters wide and about 30 centimeters thick. They are woven on barges in length of about 300 meters, and float on the surface of the water with one edge resting against the river bank. The fascines are bound together with galvanized cables and wire and also pole stiffeners, thus forming a very strong mattress. When completed it is covered with stone until it barely floats. Stone barges are then placed along the upstream end of mat, the sustaining lines are slackened, more stone is added, and the head of the mat sinks to the bottom. The stone barges are dropped down as the mat sinks with the added weight of stone thrown upon it. This mattress is sunk at low water and serves to protect the low-water bank from low-water line down.

The bank about the low-water line must now be graded down to a slope of 3 to 1 with a hydraulic grader, as already explained. This graded bank is then closely paved with stone to a depth of about 25 to 30 centimeters. This grading, and also the low-water mattress in place on the bottom, is well shown in a section model. A third model shows an improved river bank with upper and lower protection in place and also a levee with its hollow pits and banquettes. This model is also made from an actual survey, and a careful attention to details has been shown in its construction. A completed bank revetment costs about \$88 per meter in length along the bank. This comprises the mat and stonework below low water, and the grading and paving above low-water line.

In some cases, as at New Orleans, the depth of the river is very great, and the banks are consequently steep. In such cases spur dikes placed normal to the banks at intervals of about 110 meters are used to good advantage. Two models show this class of construction where the water is over 50 meters deep. These dikes are made of fascine mats piled on top of one another, having due regard for the width of base and slope required for stability. These dikes are placed on a foot mat which extends well out beyond the dike in all directions to prevent the scour which would otherwise undermine it. One of the models shows the details of construction, even down to the bolts and spikes used.

All of the above work was further illustrated by a large number of photographs, volumes of detailed drawings, and published reports of the work from its inception down to date, all of much interest and value to the hydraulic engineer.

There were also two models showing the methods of coal and grain transportation. The size of cargo carried downstream has probably no equal in any other part of the world. Even the load of the greatest ocean carriers is small in comparison. One stern paddle-wheel steamboat has taken as high as 52 coal boats at a single trip, aggregating 45,000 tons of coal. Over 30,000 tons at a trip is frequently carried. The trip from Louisville to New Orleans, a distance of over 1,400 miles, is made in about fifteen days. The actual cost of transportation, including the return of boat to Louisville, is about 10 cents per ton. The model shows the steam towboat and 27 coal boats. Not the least interesting feature is the method of fastening together this mass of boats in such a way that the towboat can guide them with certainty and safety.

Grain is transported from the interior to the seaboard in bulk in barges constructed for the purpose. These barges can also carry ordinary package freight. They are also handled with a stern-wheel towboat which takes from five to eight barges at a trip, or about 10,000 tons. A fine model shows this class of transportation in detail.

An elaborate survey has been made of the great river from its head waters to the Gulf of Mexico. This survey comprises a high-grade system of triangulation, a line of levels of precision, hydrography, and a strip of topography with contours for a width of about 1,500 meters on each side of the river. Bench marks have been established at intervals of 3 miles along the river, giving two marks on each bank of the river on a line normal to the stream.

These marks consist of two parts, viz, a tile subsurface mark about 40 centimeters square and 10 centimeters thick. This tile is placed from 1 to $1\frac{1}{2}$ meters below the surface of the ground, where it can not be easily disturbed. Its surface is well marked, so that it can be easily identified. The surface mark is a wrought-iron pipe about 10 centimeters in diameter and $1\frac{1}{2}$ meters long. The top is covered with a bronze cap, and the base is expanded so that it can not be pulled out. The cap is also well marked by means of letters cast in it. This surface mark is placed in a vertical position centrally over and resting upon the tile. The elevations and geographical positions of all of these marks are carefully determined, and their values are stamped on each mark. This form of survey mark was designed and put into use by Mr. Ockerson after testing a great number of marks which proved to be defective in various ways. Both of these marks were shown in the exhibit and proved to be of interest to those who have occasion to establish permanent survey marks.

Another unique device, also designed by Mr. Ockerson, is a phaseless target for use on triangulation work. Two diamond-shaped wire frames are fastened at right angles to one another. These frames are about 2 meters high and 0.4 meter wide. They are covered with alternate strips of black and white cloth about 0.25 meter wide. This form of target has two decided merits—it is phaseless and could be seen equally well from all directions; its tapering form adapts it to either long or short distances, and its peculiar form makes it unmistakable. These targets have been used with great success for several years, and the closure of triangles within a limit of two seconds has thereby become an easy matter.

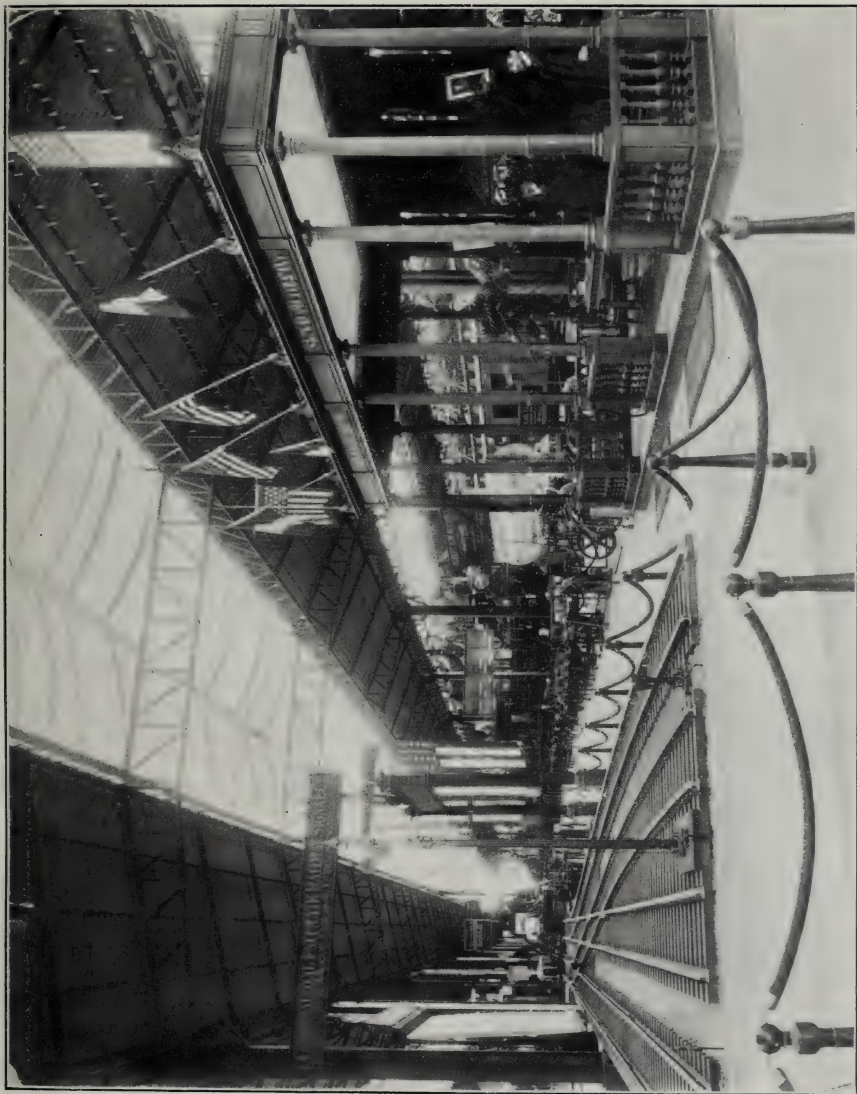
The results of the surveys were shown in two series of admirable maps, one on a scale of 1 to 20,000, showing hydrography, topography, and contour in much detail; the other showing channel and adjacent topography on a scale of 1 to 62,500. There were also general maps of the alluvial valley, showing area subject to overflow and the tributary streams within that area. The methods of making the field records and sketches were shown by numerous examples of various kinds, as were also the various steps from field notes to published maps.

The conventional signs on the finished maps, such as trees, grass, sand, cultivated, etc., as well as all lettering, are put on with mechanical devices invented by Mr. Ockerson. The work is very well done by this means, and has the advantage of giving a uniformity in a large series of maps which can not be secured where many different draftsmen are employed. It also has a decided advantage on the score of economy. The method is being largely used in the United States, and is also being satisfactorily employed in India and other countries. There were other minor features of the exhibit which were also interesting.

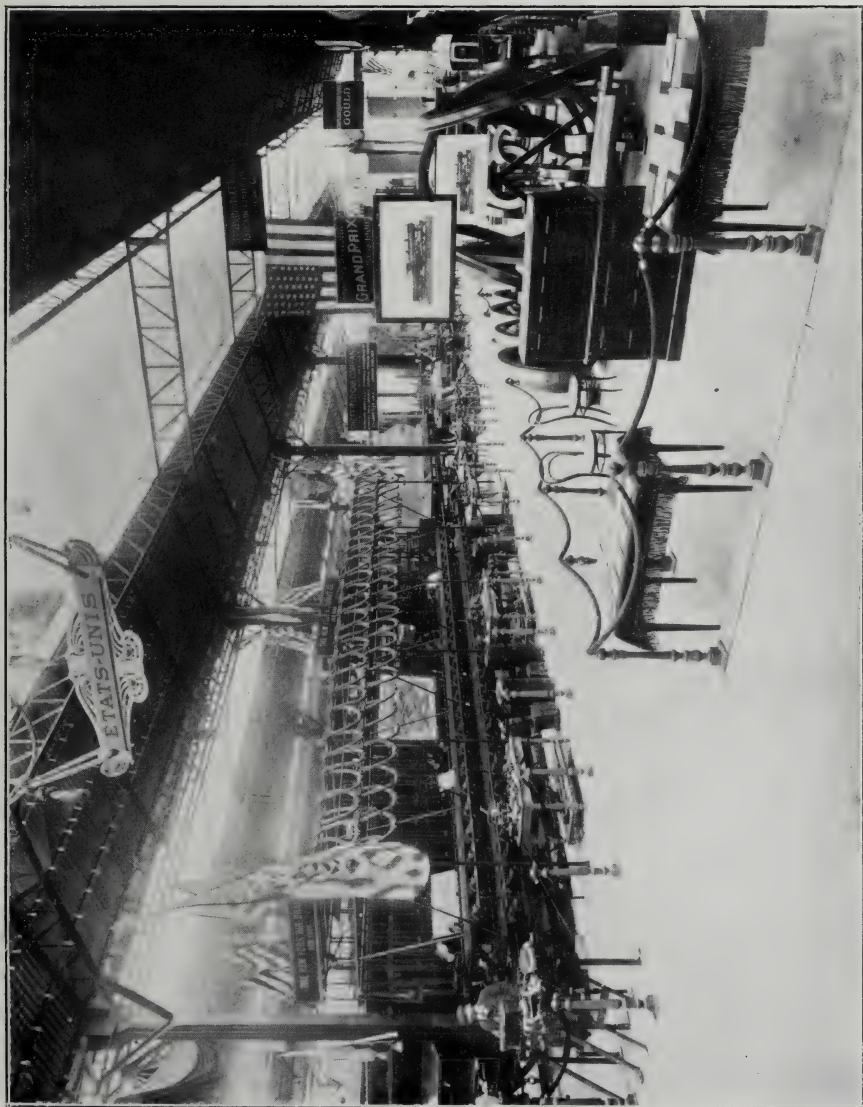
As a whole, the exhibit was an admirable one and was richly entitled to the grand prize which was awarded it. Engineers will be especially gratified to know that seven of the collaborators, engineers who have spent years on this great work, have been rewarded with gold medals. It is regretted that owing to the difficult location of this exhibit it is not well shown in the photographs. A part of it only appears in the photograph of the exhibit of New York City and the State of Massachusetts, E 4.

EXHIBIT ILLUSTRATING THE STEEL-FRAME METHOD OF CONSTRUCTING LARGE BUILDINGS.

Among the most interesting developments of the last few years in engineering in the United States is the principle of steel framing, now generally used in public buildings and especially in the high buildings popularly known as "sky scrapers." This class of architectural engi-



E-9. SIGNALING APPARATUS, RAILROAD OILS, STEEL-TIRED WHEELS, ETC., IN RAILROAD BUILDING AT BOIS DE VINCENNES.



E-10. AIR-BRAKES AND STEEL-TIRED WHEELS, IN RAILROAD BUILDING AT BOIS DE VINCENNES.

neering is practically unknown outside of the United States, and it was believed that an exhibit which should illustrate it graphically and thoroughly would be a most interesting and important contribution to the Exposition. The Western Society of Engineers having interested itself in the project, found one of its number, Mr. Corydon T. Purdy, who had the necessary ability, experience, and patriotism to undertake the work. This gentleman planned and organized the exhibit and devoted to it a vast amount of time and energy. The George A. Fuller Company, the largest contractors for the erection of this class of buildings in the world, assumed the burden of the expense, while the Commissioner-General for the United States undertook to provide for the large expense of transportation and erection—properly considering that an educational exhibit of this kind could not be entirely provided for by private expense, its object being rather the glory of the country than any direct business advantage or profit. A large portion of the articles were contributed by other concerns, as will be seen by the list. The plaster model was the contribution of Mr. Cass Gilbert, of New York and St. Paul, who was the architect of the Broadway Chambers (corner of Broadway and Chambers street, New York), which was the building selected for illustration.

The exhibit was centrally located on the ground floor of the United States space in the palace of civil engineering and transportation, as appears in Photographs E1 and E2. A solid foundation was prepared for the massive terra-cotta façade which formed the background, and the other articles were arranged between it and the main aisle in the best manner possible in space rather too limited. The novelty of buildings of such height made the exhibit a popular attraction. It was also visited by great numbers of architects, engineers, and builders from all parts of the world. Competent attendants were at hand to give any desired information, and finely illustrated printed matter was also provided.

The most interesting feature of the exhibit was the model of the building made of plaster of paris and its counterpart, the metal model of steel framework made separate from the walls and floors. The plaster of paris model was made at a cost of about \$1,000, and the metal model cost about \$3,000. Both of the models are constructed to a half-inch scale, which makes them stand about 11 feet high. They show every part in exact proportion and are complete in every detail.

The metal model is made of brass, of which about 20,000 separate pieces were used. Each beam is made of two pieces of the sheet metal, channel-shaped, formed in a die, and soldered back to back, the perfect shape of the flange being obtained by the use of solder on the top and bottom. Each of the beams in the model is worked out in this way with the greatest precision. The columns were also shaped out of sheet metal in much the same way, each piece in the full-sized column in the

building being represented by a similar piece in the model. Where three or four plates were riveted together in the building three or four separate pieces of metal are soldered together in the model so as to make the whole of the proper proportion. To obtain the perfection of alignment of all parts it was necessary to fabricate them all in forms made specially for the purpose, so that there could be no variation whatever in dimensions. The interest in the model was greatly enhanced and its value as a demonstration of the character of the work in the building was greatly increased by an exhibit of some of the most important sections and connections of the ironwork in the building. These sections and connections were made full size, an exact reproduction of the materials as they were used in the actual construction. They were manufactured and contributed to the exhibit by the Carnegie Steel Company, of Pittsburg, who manufactured all the iron required in the building. The ground work, retaining walls, and foundations in the model were made with iron castings combined with sheet brass, worked in such a way as to make the imitation of the original building as perfect as possible.

The model was also made to show the heating, plumbing, and elevator construction. Everything pertaining to the heating system was red, the plumbing pipes blue, the elevator cars bronze, and the machinery black. This color scheme made it easy to follow these elements of construction through the labyrinth of the structural members which, in the model, were all nickel plated.

The heating system was put in the building by Wells & Newton, of New York City, and they contributed a radiator to the exhibit like those used in the building. Parts were cut in section to show the internal construction.

The plumbing was put in the building by Mr. Thomas J. Byrne. A special exhibit was made to show the character of the fixtures and the details of the piping. It was arranged on a short piece of partition with marble backing and tiled floor, with all parts complete as in the building. The Empire City Marble Company, of New York, who furnished the marble for the building, also furnished the marble for this exhibit.

The method of operating the "flushometer" connection to the water-closets was also shown by a sectional model furnished by the Kenny Company, of New York City, who furnished the closets for the building.

The elevator system was illustrated in the metal model by miniature cars and a complete duplication of the operating machinery, all parts of which were made as exactly as possible to scale. One of the miniature cars was connected with an electric motor and kept in constant operation, making the trip from the bottom to the top of the model and return in about the same time as the original car does in the build-

ing. The moving sheaves connected to the cylinder moved up and down exactly as though propelled by hydraulic power.

The other contributions to the exhibits most closely allied to these were perhaps those relating to the power plant. The boilers for the building were furnished by the Clonbrock Steam Boiler Company, of Brooklyn, N. Y., who also contributed a model of these boilers which shows the character of the construction. One unit of the electric plant was duplicated in the exhibit by the contractors for the generators, the Bullock Manufacturing Company, and the contractors for the engines, the Payne Engineering Company. The dynamo used was the multipolar engine type, with ironclad armature. It was rated at 50 kilowatts, 275 revolutions, 110 volts, was compound wound, and had a capacity of 800 16-candlepower lights, equivalent to 66 horsepower delivered at the brushes. The pole pieces are composed of thin lamination steel alternately cut away, whereby the longer member projecting over the shorter can become highly saturated. Armature reaction is therefore ineffective and eddy currents are inappreciable. The sparking point of these machines is reached only when the current density of the brush-contact surfaces exceeds the carrying capacity. The armature coils are separately insulated—a construction rendered possible by the employment of wide openings at the armature slots, through the top of which openings the armature coils are dropped in place. The coils are held in place by wooden wedges carried in recesses notched at the top of the armature slots. Band wires are unnecessary. So rigidly constructed are the commutators that irregularity in the bars is impossible. The commutators last as long as the machine, for the tension of the brush holders is exceedingly light. The parts of the machine are so designed and combined that symmetry of appearance is obtained as well as efficient operation under the most severe conditions.

The engine is connected directly to the dynamo. The engine is high speed, with center crank, automatic cut-off, inertia shaft governor, balanced slide valve, and automatic lubricating system. It develops 80 indicated horsepower at a speed of 275 revolutions per minute. The governor regulates the speed of the engine within 1 per cent of the normal throughout all extreme variations of load and steam pressure.

The switch board belonging to this plant was also duplicated in the exhibit of Mr. H. Krantz, of Brooklyn, who furnished the switch board for the building. It was so arranged that the total current was fed into a main double-throw, 1,000-ampere switch, in order that the building can be connected either with the public system of lighting or with the generators. Each generator is protected by fuses and a single-pole circuit breaker. A multiple volt meter is provided, which gives readings on either dynamo and acts at the same time as a ground detector.

The switch board installed at the Paris Exposition differs somewhat from that of the building. One dynamo switch was omitted, and the main throw-over switch was also omitted. Four circuit switches were mounted on the board, instead of 14, and only one ammeter and one rheostat were provided, instead of two, while the circuit switches were all two-poled, instead of three-poled, and connected directly with the dynamo-switch bus-bars, instead of with the main throw-over switch bars. The feeders of the switch board at the building serve centers of distribution in the subbasement, basement, ground, and first floors. From these centers of distribution special feeders and branch circuits radiate, which serve the outlets for the lights. Feeders likewise extend from the switch board to exhaust fans located in the basement and on the roof at the ventilating shaft. All the wires are inclosed in rigid iron Sprague conduits, terminating at the outlets in Mezger Universal outlet boxes. The wires are drawn from one outlet box to the other and to the distributing center. The conduits were installed while the building was in course of construction and connected behind the finish line, but in the exhibit they were placed on the surface in order to illustrate the method of insulation. The outlet boxes used are an improvement on those ordinarily employed in so far as they can be used for a great number of purposes, irrespective of the manner in which the gas and electric conduits are installed relatively to their entrance into the boxes. The fixtures for the lighting of the exhibit were contributed by J. B. McCoy & Son, of New York City, who furnished the fixtures for the building.

The exhibit of terra cotta was imposing. It was contributed by the Perth Amboy Terra Cotta Company, who manufactured the terra cotta used in the building. The exhibit consisted of a portion of the exterior wall, an exact duplication of that in the new building, erected in the rear of the space allotted to this exhibit, making a construction about 20 feet wide and 40 feet high. It illustrated the practice of American architects in using terra cotta in large motive in place of stone, and the particular part selected was chosen with special reference to showing this feature of construction as fully as possible.

There were two other exhibits illustrative of structural details. One was the section of a room with all the features of its construction, and the other a series of five wall sections. The section of the room was a perfect reproduction in full size. The iron framework, the fireproofing in the floors, the fireproofing in partition walls, the interior finish, the floor, the door and door trim, the cement base, electric wiring, lighting fixtures, the plaster, and, in fact, every detail of the construction were shown in this exhibit exactly the same as they would be if the exhibit itself had been cut out from the building without in any way disturbing the portion removed. Each portion of this construction was contributed by the contractors for that particular material as used in the construction of the building.

The same thing was true of the wall sections. They were taken at different places in the building, from the window sill of one story through to the window head of the story below, including not only the wall, but a portion of the floor immediately adjoining. They showed the sections of the beams and all other members of the steel frame inclosed in the wall construction and illustrated how the other materials are supported. In fact, these sections brought out this peculiar characteristic of modern buildings, the supporting of the walls on a frame, more distinctly than could possibly be done in any other manner. The utmost pains were taken to make the appearance of the section exactly as it would be if it were really cut out of the building. One section was taken at the third floor, showing the granite construction; one at the fourth floor, showing the brick construction, while the others showed the terra-cotta construction, one at the fifteenth floor, one at the sixteenth, and one at the roof. The one at the fifteenth floor showed the recessed wall forming the loggia in the fifteenth and sixteenth stories, and the one at the roof showed the overhanging terra-cotta cornice. The anchors holding the terra cotta in position were placed, as much as possible, where they could be seen so that the character of the support may be thoroughly understood. The granite was furnished by Mr. John Pierce, of New York City, and the iron by the Carnegie Steel Company, the fireproofing by the National Fireproofing Company, the woodwork by the Henry Taylor Lumber Company, the anchors by the Lincoln Iron Works, and the lighting fixtures by J. B. McCoy & Son.

The hardware used in the building was shown to some extent in the exhibit of the room as described, but there was also a separate and more complete exhibit. The large perspective drawings were prepared and contributed to this exhibit by the architect, Mr. Cass Gilbert, together with the elevations and plans sufficient to show the excellent character of the building as fully as can be shown by the drawings. The drawings of the steel construction of the building were contributed by the consulting engineers, Purdy & Henderson, of New York City, who designed the steel work and the foundations of the building. They comprised both general and the detailed drawings used in the mills and shops for the fabrication of the materials.

The following description of the construction of steel-frame building and arguments in its favor is worthy of reproduction here. It is from the pen of Corydon T. Purdy, consulting engineer.

STEEL-FRAME CONSTRUCTION.

Most of the business buildings recently erected in the United States are constructed after the manner of the Broadway Chambers. They constitute a class quite distinct from the older buildings, which are of massive construction, modeled more after the methods of France and southern Europe. One has been evolved from the other, yet there are

marked distinctions between the two. In appearance they may be much the same, but one is massive in fact, while the other only appears to be so.

The heavy walls of the old buildings are required to carry the loads of the floors as well as their own weight and to give the building its lateral strength. Of necessity, their thickness must increase rapidly as the buildings are made higher, and in buildings more than five or six stories high the windows must be made small, or the walls are even then so thick that the space they occupy is a real burden to the building. All business buildings are commercial enterprises, and whatever reduces their earning power is objectionable. In a building about as wide and long as the Broadway Chambers and about ten stories high the difference in rental on this account alone might be 8 or 10 per cent of its net, or profit, income.

In the old buildings it was not always easy to trace the effect and support of a given concentrated load, and the exact distribution on the foundations of the weight of a building so constructed was not always easy to determine, if, indeed, it could be determined at all. In the steel-frame buildings, however, the distribution of loads is definite, the conditions are reversed, and there is concentration instead of diffusion.

In massive construction many features and details are necessarily fixed by empirical rules and practice, and calculations can not be made with anything like the definiteness and certainty which always obtain in the designing of steel construction. Indeed, in the new buildings nothing is done from first to last empirically. Everything is fixed by definite calculation, the same as in bridge construction.

In the new buildings the walls are carried on the steel frame from floor to floor, and they do not even carry their own weights, except from one point of support to the next. Their only use is to inclose the building. For all practical purposes, comparatively thin walls are therefore as serviceable as thick ones, and the height is immaterial. If a wall 16 inches thick will do on the top floor it will serve equally as well near the ground. When carried on steel, the walls can therefore be made the same thickness the entire height of the building, and this makes a material reduction in the weight of the building, which, in turn, reduces the foundation construction.

When all the weight of the exterior walls and the adjacent floors is carried by steel columns, the space required for a column to carry a very heavy load is not very much greater than that required to carry a small load. Consequently, so far as the strength of the building is concerned, the piers between windows can be kept the same size on the lower floors of the building that they are at the top, and in all cases they may be made as small as the proper protection of the column will permit. As a matter of fact, the proper proportioning of the façade almost always calls for wider piers than the construction

requires. Window areas can therefore be made much greater than in massive construction, and in many of our large cities this is an extremely important factor in the value of the building for rental purposes. The difference between a half-lighted office with small windows and deep-set jambs and a well-lighted office with large windows is so radical that most tenants are willing to pay a larger rental for the well-lighted room. In every American city where the new steel-constructed buildings have been erected, the light and added cheerfulness of its offices have made the old buildings unpopular.

The architectural character of America has been often criticised both at home and abroad, but no one finds any fault with an office filled with sunshine. How to best proportion a very high building may be yet an unsolved problem, but that difficulty will not prevent their continued construction. The new building is also criticised because the façades are not what they appear to be—solid, self-supporting walls; but the men who have exchanged a dull, dingy office for a light, cheerful one do not stop to inquire whether the artist is satisfied or not. These difficulties must be met, and our artists and our architects must be resigned to it wherever the new building is tried.

There is another radical difference between the two classes of buildings in the construction of interior walls. In a typical building of massive construction the division walls are as fixed a part of the construction as the façades. This characteristic of such buildings necessitates an arrangement of rooms on every floor with reference to fixed division lines and there is no possibility of change. Whatever changes there may be in tenants, or whatever change in its use may be desired, everything must be molded to the fixed arrangement of the rooms as originally planned. In the new buildings this condition is entirely changed. It matters not how large an area the building covers, the old-fashioned heavy division wall is discarded and the entire interior of the building is supported on columns. The partitions between the rooms are erected to suit the tenants of the building, and these thin walls are carried by each floor without regard to the arrangement of the rooms, either above or below. They can be taken out at any time without injury to the building, and it is, therefore, possible to rearrange the rooms at any time to suit new tenants or to add to the renting value of the structure.

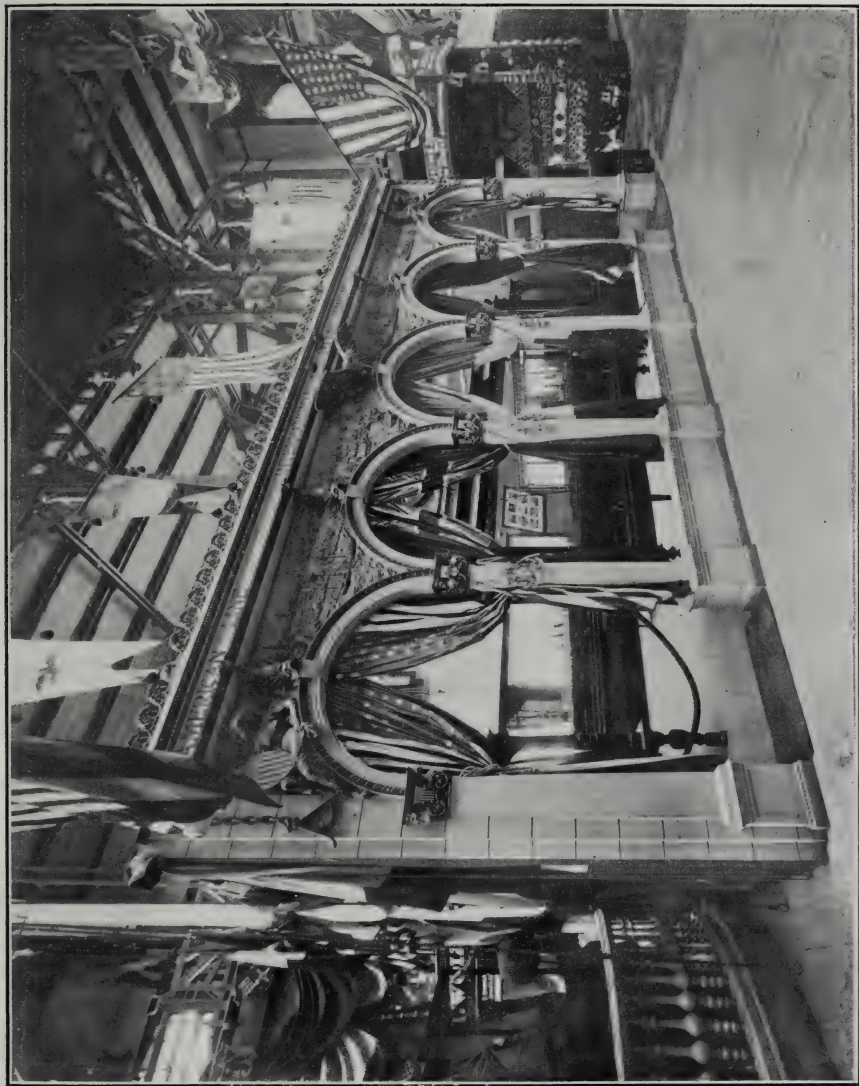
The problem of making the new buildings as proof against fire as the old ones involves quite different conditions, but it has been satisfactorily solved. The massive building is fireproof because the construction everywhere is so thick and heavy that the effect of a fire can not be far-reaching, even though the materials exposed are themselves destructible. Nearly all kinds of stone and some kinds of brick and terra cotta are of this character; the exposed surfaces may be greatly

injured by a fire, but the hidden portions of the construction are protected and the building is not destroyed. On the other hand, the fireproof qualities of the steel-constructed building depend entirely upon the good character and the perfect indestructibility of the exposed materials; the metal frame must be covered everywhere, and the covering must resist the effects of fire and prevent the metal frame from being seriously heated. Stone and some forms of brick and terra cotta construction do not make a suitable covering. They are incumbustible, but they nevertheless break to pieces when exposed to a great heat. The fireproofing everywhere must be indestructible. Exposed ironwork can not be depended upon in a fire. Even the partial collapse of the fireproof material in a steel building may so expose the frame as to directly or indirectly bring about its complete destruction. With all the latest perfection in the art of fireproofing, it is now possible to make a steel-constructed building that can not be destroyed by any kind of a fire, either from within or without. Many of our so-called fireproof buildings are not so constructed, but the best of them are perfectly fireproof, and the standing of great buildings in this respect is being constantly raised. American cities have probably suffered less than London and Hamburg from the improper use of steel in buildings, and it is due more than anything else to the high development of fireproofing methods in America. No one, therefore, should be prejudiced against steel buildings on this account.

The endurance of the new buildings has also been often questioned. It is pointed out that the long life of buildings of massive construction is already proved by centuries of trial, and that the rapid decay of steel is everywhere apparent. It is true also that the advocates of the steel-constructed building can prove but little from the short experience they have already had with them, and they must acknowledge, from indisputable evidence, that some of the steel buildings already erected will not long endure. On the other hand, judging a priori, it would seem that there is no good reason why buildings can not be built with steel frames that shall continue to exist indefinitely. Corrosion can not proceed without both moisture and air, and with good painting and good covering there is no reason why the iron and steel frame should not be protected from both. Proper care during fabrication of the material and immediately afterwards can prevent an initial corrosion. Even the best painting has not proved to be a permanent safeguard for exposed surfaces, but there seems no good reason to question the permanence of first-class paint coverings where the painted surface itself is perfectly protected, as should be the case in all well-built buildings. Indeed, it is quite possible to protect the iron from corrosion without the use of paint or other substitute for it. Portland cement concrete and Portland cement grouting are perfect conservators of iron, and it is quite possible to erect a steel building with all metal



E-11. STEEL CARS AND BOLSTERS, CAR COUPLINGS, AND STREET CARS, IN RAILROAD BUILDING AT BOIS DE VINCENNES.



E-12. MERCHANT MARINE. FACADE OF INTERNATIONAL NAVIGATION COMPANY. AMERICAN LINE.

surfaces covered with one or the other. The painting, however, is well worth the expense. It prevents the initial corrosion which is otherwise certain. The problem of protecting iron in buildings is radically different from protecting it in bridges, and experience with the one is no criterion for the other. Neither stone nor brick work nor any other kind of wall material should come in direct contact with structural steel in supporting walls. In all cases there should be a coating, not less than one-quarter of an inch thick, of good Portland cement mortar intervening. Around the columns in the walls this coating should be fully a half inch thick.

Pipes and wires of all kinds should properly be kept free from the structural iron, and when they are made to follow the columns they should be kept free from the metal by a separating and insulating wall which will perfectly protect the column. Every part of the steel must be protected from both corrosion and fire, and if the same operation is not competent for the purpose a special means must be adopted for each. The direct contact of Portland cement in the forming of grouting or concrete seems to be one of the surest means of preventing corrosion, but it is of little or no value as fire protection. Porous burned fire clay terra cotta construction of good thickness seems to afford altogether the best protection against fire. The porosity of the material prevents cracking and crumbling through unequal expansion, while the hollow character of the product makes it nearly equal to two separate walls in protection. For exterior walls nothing has been found to so perfectly protect the steel embedded in them as first-class hard-burned brick, laid in cement mortar, and this is also the best protection against corrosion. Reasoning, therefore, in this way, steel buildings ought to endure as long as those built of solid masonry.

In all properly constructed steel frames the columns must be proportioned to the loads, both those which are actual and those which are problematical or possible. The beams must be made strong enough to carry the weight of the floor itself, including all of the materials that enter into its construction, and in addition thereto an allowed load for the service of the building. In New York 75 pounds is required for office floors, 60 pounds for dwelling houses and hotels, 90 pounds for rooms used as places of public assembly, 120 pounds for ordinary stores, 150 pounds for factories, and greater loads for warehouses, according to the character of the materials to be stored.

The steel frame must also be designed for lateral strains. In New York it is required that all structures exposed to wind shall resist a horizontal wind pressure of 30 pounds for every square foot of surface exposed from the ground to the top of the building, including the roof, and in every direction; also, that the overturning moment due to the wind shall in no case exceed 75 per cent of the moment of the stability of the structure. It is ordinarily possible to construct a

steel frame in such a way that it will be able to resist an overturning moment great enough to induce tension in the columns on the windward side of the structure. If this limit in any given structure also meets the requirements of the law, then the structure is ordinarily a possible one. If it does not, the dimensions of the structure must be changed; either it must be made lower or the size of it in plan or its weight must be increased.

A great many methods have been devised to meet this requirement of providing for the lateral strength. In some buildings, as in the Broadway Chambers, it is done by putting in deep girders, with gusset plates either in the exterior or in the interior, or both. In other cases it is provided for by direct bracing, as is ordinarily done in tower construction. In some buildings it has been found practical to put in vertical lines of portals, made of angles and solid web plates, forming arches in each story between columns in such a way that it will not be necessary to close the space by a solid partition.

In small buildings, generally speaking, the steel-frame method is not quite as economical as massive construction, but even in buildings of this size the combination of the massive construction and the steel-frame construction can often be employed to considerable advantage, and economically so. When the buildings are very high, the steel-frame method is altogether the most economical. Indeed, it would be impracticable to build a massive building as high as most of the high buildings in New York are constructed where the steel-frame method is employed, and this points to really the greatest advantage belonging to this method of construction—that is to say, the increased renting area obtained by increasing the number of floors. If the cost of the ground is not increased sufficiently to neutralize the advantage, the iron building can be made to pay a much larger income on the investment than a building of lesser height, and this is always, of course, the crowning argument in favor of the high building.

For large buildings, then, the steel-frame method is to be distinctly preferred to the old form of construction. With thinner walls the renting area is increased and the weight lightened so as to materially simplify the foundation problem, shortening the time required for the construction of the building, and lessening the cost. With the strength of the building in its metal frame instead of its masonry, the light areas can be greatly increased, and the comfort and attractiveness of the building correspondingly improved. With the interior of the building supported on columns, the arrangement of its rooms can be modified from time to time to meet changing conditions and requirements. With the use of steel all problems of strength can be clearly defined, the proper proportioning of all parts of the building can be easily and definitely determined, and the strength and good character of the structure can be absolutely assured. And finally, from the

point of investment, the steel-frame method makes perfectly practical an increased height, more floors to rent, and more income from the same ground rental.

It may be added that all these advantages within reasonable limits are also multiplied in proportion as the height of the building is increased. As we have seen, the new building can be fireproof, and with care it can be constructed so as to endure indefinitely. Without doubt there is a limit of height above which all buildings should not be built, but the best American authorities are now pretty well agreed that the objections to buildings of great height do not hold with force to buildings of twelve or eighteen stories, and that the rare advantage to the business of a great city in bringing its financial operations into small areas more than counterbalances the disadvantages commonly accredited to the construction of such buildings. The sunlight is not excluded from any street all day long, and there is no city suffering from lack of sunshine because of high buildings. New York has the highest buildings, and they are built on her narrowest streets, and no suffering has followed. Traffic becomes congested, it is true, but means are made to meet the congestion, and the difficulty is soon overcome.

EXHIBIT OF THE ENGINEERING DEPARTMENT OF THE CITY OF NEW YORK.

The engineering department of New York City was represented by a topographical map drawn on a scale of 600 feet to 1 inch. This map was made under the direction of Louis A. Risse, chief topographical engineer of the city, and is the largest ever made of any single city, being 31 feet long by 27 feet wide.

It shows the buildings and contour lines, and delineates the topographical features, as well as the development of the city from its beginning to the present time. In addition to the legally laid out streets, which are tinted buff color on the map, a tentative or preliminary plan of streets in sections of the city where no official map exists is designated and tinted red, while existing and proposed parks are shown in green color. Such tentative plan is only considered as a suggestion in order to show in which way the territory is capable of treatment or development, and at the same time it also demonstrates the progress of the improvements proposed under the direction of the board of public improvements.

While the area covered by Greater New York is 308.11 square miles, the area of the city and vicinity, as shown on the map, includes nearly 1,000 square miles. The border of the map is neat and artistic, and is made up of numerous views of the most prominent buildings and the most picturesque parts of the city. The map is raised on an inclined wooden platform. Every house is shown, every street, alley, court, or space. Special attention has been paid to the delineation of city property, including schools, police and fire stations, ferries, and

also existing routes of travel, i. e., by surface and elevated railroads. The map in addition locates the prominent public buildings, business structures, etc., and gives an idea of the topographical features of the city, its system of parks and driveways, and other pleasure places.

The installation was excellent. A raised and railed platform was erected, from which the visitor, aided by opera glasses provided for the purpose, could examine the minutest details of the map.

In addition to this large map there were smaller maps exhibited as a contrast to the large map and to show the wonderful development of the city within such a comparatively short period. There was also an exact duplicate of a relief map of Manhattan Island in 1776.

An attractive feature was added in the shape of a number of photographic transparencies of public buildings and other notable structures.

EXHIBIT OF THE PUBLIC WORKS OF THE BOSTON METROPOLITAN DISTRICT.

In the center of the United States section in the gallery of the civil engineering and transportation building stood the attractive display of the public works of the Boston metropolitan district, contributed by the Commonwealth of Massachusetts. The rich old English oak woodwork of the colonial façade, hand carved throughout, blended harmoniously with the green of the burlap-covered walls. The inclosure was about 20 by 30 feet, with walls 13 feet high. From the frame of the end door to the cornice the space was filled by the escutcheon of Massachusetts, handsomely carved and finished in blue and gold; perched on the cornice above was the American eagle, with wings uplifted, carved from the solid wood. Above each of the two side doors, on a paneled frieze supporting a pediment, appeared the name "Massachusetts." The four exterior walls were given up to the intramural transportation of Boston and its suburbs. The interior was devoted to the public engineering works of the Boston metropolitan district and to the investigations of the State board of health in sewage and in water purification. Both within and without the names of the exhibits below were worked into the architrave.

The front and one side were covered with plans, sections, and photographs of the new south terminal station. The maps of Boston in 1896 and in 1899 told at a glance the enormous benefits from combining the whole traffic into two grand stations within easy access of one another. Ten photographs, taken at intervals of two months, showed the rapidity of its erection from June 15, 1897, to its opening, on December 27, 1898. Under the 28 long-distance tracks the double-track loop, to be utilized in connection with the equipment of the local service with the third-rail electric system, will permit the handling of passengers with greater rapidity than by any other method, since the platform between the tracks is used only for loading, while the two

others are used for unloading, the train continuing on its way without switching, making this a terminal station combined with the advantages of a through station. In comfort, accommodations, and general arrangements this station stands the foremost in the world to-day. Its cost, design, and all the details of its construction are ably summarized by the resident engineer, Mr. George B. Francis, in an excellent paper presented to the American Society of Civil Engineers and reprinted by the Boston Terminal Company for the Exposition. A grand prize was awarded to the exhibit and a gold medal to Mr. Francis as a collaborator.

The other side of the exterior façade was given up to the photographs, blue prints, and drawings of the underground electrical street railway of Boston. A series of progressive drawings illustrated the use of the shield with but little bracing for tunneling where heavy pressures were encountered. Plans, sections, and profiles gave a general idea of the engineering problems involved. Explanations in English and in French on the photographs described the steel and brick arch construction, the horseshoe concrete sections with reenforced arch, the stations, the taking of cars, the methods and materials employed, and the prosecution of the work without interruption of the traffic, which, together with the loop tracks, excited the greatest interest. A complete set of the annual reports of the Boston transit commission and a volume of reports on rapid-transit investigations are found upon the shelves; these elaborately prepared reports contain a mass of data valuable to all engaged in similar work. A grand prize was given to the exhibit, and a gold medal to Mr. Howard A. Carson, the chief engineer, as a collaborator.

The rear wall was covered by a large wall map of Massachusetts, showing the development of the street railways and their comparison with the steam railroads. The remainder of this exhibit consisted of the annual reports of the railroad commissioners of Massachusetts; the three albums of photographs of the construction and equipment of the street railways of the Commonwealth; the special report on street railways and municipalities; and the monograph on the development of street railways in Massachusetts, by the secretary of the Massachusetts board of Paris Exposition managers, Mr. Walter S. Allen, who received a silver medal as a collaborator. This exhibit, with the subway exhibit, formed a valuable lesson in the construction, equipment, and management of electrical street railways for urban and interurban traffic.

The State board of health showed nine enlargements and 56 photographs of sand filters, irrigation fields, and experimental tanks for purifying both sewage and water. The Marlboro and the Clinton filtration beds are a part of the metropolitan water system in that they are necessary to prevent the contamination of the drainage area

of the Sudbury River and the reduced volume of the Nashua River, respectively. The 16 volumes of annual reports, with hundreds of pages of data obtained from the work at the Lawrence experiment station, of which an enlargement and four photographs were shown, the examination of public water supplies, and the sewerage investigations justify the world-wide reputation of the State board of health and of the Commonwealth for the protection of the health of its people. The exhibit and the chief engineer, Mr. X. H. Goodnough, each received a silver medal.

In the middle of the rear wall was a map of the metropolitan sewerage district. The prominence given to the main interceptors, pumping stations, and outlets give at a glance the general features of the present system of sewage disposal for Boston and its suburbs. On either side of the map were nineteen photographs showing the method of tunneling employed, the best excavating machines used, the installation and appearance of the Deer Island pumping station, an excellent type of a modern sewage pumping station fitted with three centrifugal pumps, the launching and setting of a 74-inch siphon under water, and the standard cross sections of the sewers. A complete set of annual reports since the beginning of the commission in 1889, together with the monograph printed for the Exposition, give a detailed account of the conception, construction, and maintenance of the systems. The total cost of the main portions of the systems, as pumping stations, interceptors, basins, etc., with the estimated cost of the high-level sewer now under construction, is \$18,000,000. The exhibit and the chief engineer, Mr. William M. Brown, jr., were each awarded a gold medal.

On a large wall map of Massachusetts, scale 1 to 625000, the collection of the rainfall upon the drainage areas of the Cochituate, the Sudbury, and the Nashua rivers, and its conduction by gravity to the distributing reservoirs at Chestnut Hill and Spot Pond, outlined the method of furnishing an abundant supply of pure water to the metropolitan water district. The capacity of the combined sources in a period of dry years is estimated at 173,000,000 gallons per day. Studies for future supplies from the Assabet, the Upper and Lower Ware, the Swift, the Deerfield, and the Westfield rivers have been made. Among the eleven photographs and seven enlargements were views of the reservoirs and the stations, both during and after construction, cross sections of the 300,000,000 gallon per day aqueduct, illustrating its form and composition in tunnel and in embankment, the preparation of the reservoir bed, the drainage of swamps, and the filtering of deleterious run-offs. The preliminary report by the State board of health in 1895, the file of annual reports, and the monograph printed for the Exposition, contain a concise history of the metropolitan water supply. The total cost of the work in hand will probably reach \$27,000,000.

A gold medal was awarded to the exhibit and one to Mr. Frederic P. Stearns, the chief engineer.

The development of the public breathing spaces under the metropolitan park commission occupied the remainder of the space. Two framed maps, 6 by 8 feet—one of the Revere Beach reservation, the other of the Boston park system—represented the improvement of the coast and of the interior reservations under the control of the Commonwealth, the central portion of each being a plan of the property, about which are arranged photographs of views taken at different points in the improvement. A set of annual reports, together with the special monograph, described the work accomplished by the commission. The small maps depicted the extensive territory available for public use and also the proposed connections and reservations. The cost, including the Boston city parks, was about \$21,000,000.

The most popular feature of the exhibit was a topographical model, 10 feet in diameter, of Boston and its suburbs within a $12\frac{1}{2}$ -mile radius. The vertical scale was six times the horizontal of 1 to 14000. The buildings, roads, railroads, ponds, trees, etc., were faithfully reproduced, the whole being so skillfully executed that the model is said to be the best one of its size and corresponding detail that has been made.

A gold medal was awarded to the metropolitan park commission; to Olmstead Brothers, landscape artists; to the Commonwealth for the model of Boston and its suburbs. A silver medal was awarded to Mr. George C. Curtis, the geographical sculptor.

Two albums of maps showed the excellent work done by the Massachusetts topographical survey commission on the better establishment of the boundary lines.

In a well-arranged album of plans and photographs, with French and English text, the city of Newton showed the high standard in waterworks, sewerage, street improvements, abolition of grade crossings, etc., maintained by some of our smaller municipalities, this being supplemented by files of reports from the departments of the city engineer and the water board. Files of reports were exhibited from the Cambridge park board, the Boston water department, the city engineer, the park department, and the street commissioners, the two latter receiving silver medals.

The entire exhibit made by Massachusetts was wonderfully compact and comprehensive. Great credit is due to the board of managers, and especially to its secretary, Mr. Walter S. Allen.

Class 30.—This class comprised “carriage and wheelwright work, and automobiles and cycles.” It was expected until within a very short time before the opening of the Exposition that a number of the best manufacturers of carriages in the United States would exhibit their more recent work, which compares favorably both in style and workmanship with that of Paris and London builders. A tremendous

demand following a period of equal depression prevented such participation. Finding it utterly impossible, even while working double time to fill the demands of their customers, one exhibitor after another resigned his space. The Columbus Buggy Company, which has a large export trade, alone persisted and made an exhibit especially interesting from the standpoint of price. The automobiles were of course representative of the art of the carriage builder but they were not entered or considered as such.

Two locations were provided for automobiles, one for a still exhibit in the palace of civil engineering and transportation, and the other in a building designed more as a stable, at the Bois de Vincennes. From the latter automobiles could be run in and out at pleasure by the owners for trial and exhibition on the broad fine roads of the park. It is regretted that American exhibitors did not make more use of the abundant provision made for their accommodation. Until nearly the time for opening the Exposition the demands for space for automobile exhibits were so large and so numerous as to threaten to be very embarrassing. It proved, however, that the industry was in such undeveloped state that most of the companies were not ready to take and occupy the space for which they had been applicants. Those who persisted were the larger and more important concerns, whose machines were proven successful and whose work was creditable to so new an industry. The neatness of design and general elegance of the automobiles shown by them was generally commented upon and was a source of pride to Americans. That the number of awards was not greater is not surprising in view of the fact that the entire industry is in its infancy, and it is questionable how high a degree of perfection has been obtained mechanically even in France.

The location of the principal bicycle exhibit, that of the American Bicycle Company, at the Bois de Vincennes was probably a mistake. It was chosen because the great bicycle track was there, and it was presumed that the races and other events would make this the best place. Bicycles appeal to everybody and the manufacturers wish to reach everybody. The crowds did not go to Vincennes. The chaste and beautiful building is shown in Plate E, 16. It contained a very attractive exhibit of wheels and bicycle appliances of every grade, which won the highest awards easily. The building was erected by the American Bicycle Company at its own expense. This company comprised about forty of those which prior to its formation had individually been applicants for space. A few makers of bicycle parts and appliances were not included, and space for these was provided in connection with the automobile space in the Champs de Mars. At the request of this department the American Bicycle Company prepared a retrospective exhibit, illustrating the development of the bicycle from the earliest forms. This was originally displayed in the

palace of civil engineering and transportation, but subsequently removed to the Vincennes building, in order that the space might be utilized to the greater advantage of the exhibitor for the display of the most modern wheels.

Class 31.—The manufacturers of saddlery and harness having little export trade and apparently not looking for more, could not be induced to enter in competition with European makers. The three small exhibits in this class were creditable in themselves, but not representative nor calling for any special mention.

Class 32.—*Equipment for railways and street railways.*—Had the original promise of exhibits in this class not been blighted by the fatal blast of “too much prosperity,” the department would have been greatly embarrassed for space. The applications from locomotive builders alone called for all the space available for the entire class; but the embarrassment of riches quickly began to fade away. The demand for railway equipment in 1899 was such as to strain every possible facility for production. This alone might not have caused many applicants for space to withdraw, but the customers of many years insisted upon being “taken care of” and having their pressing orders fulfilled at any cost. Thus one manufacturer after another, while struggling to get material and working his plant double time, felt it necessary to relinquish his plans for exhibiting. That three locomotives were exhibited out of nineteen, for which space was asked, tells the story.

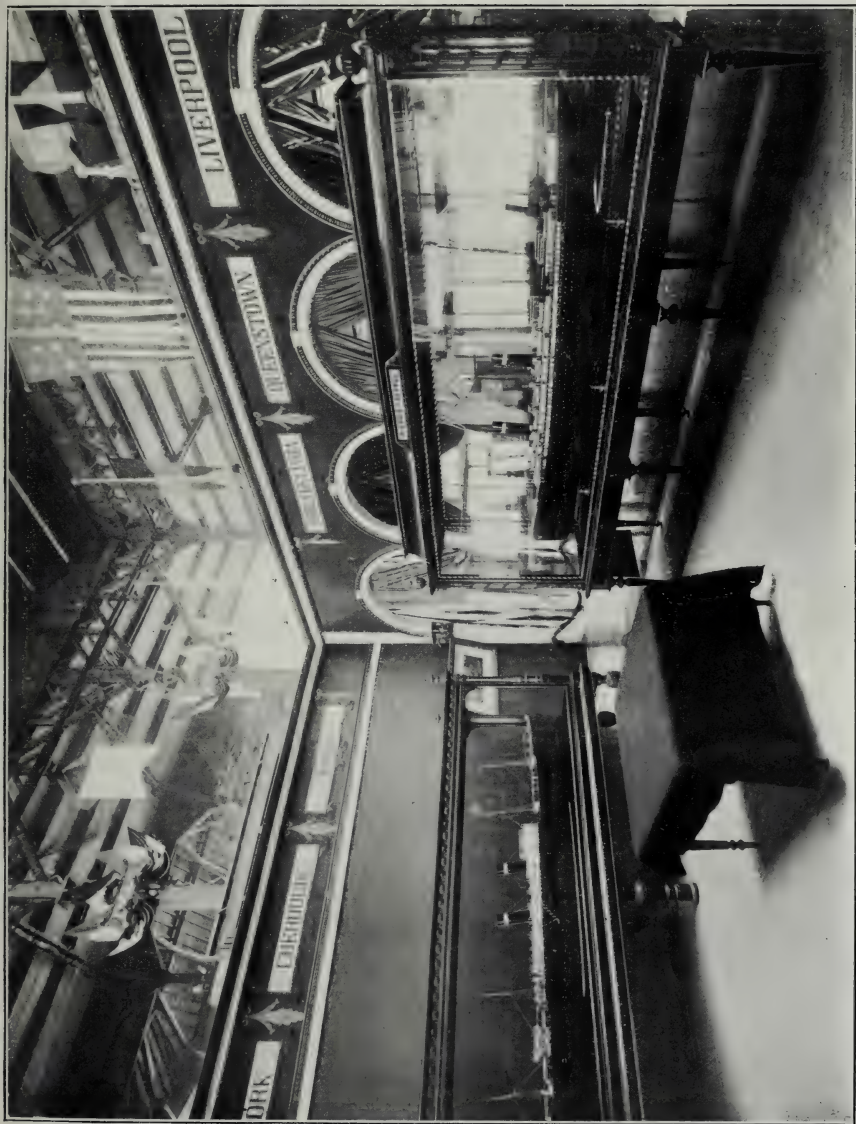
The exhibit in this class while interesting and important in every detail—there was not a worthless or insignificant article accepted—was not comprehensive. It could not have been so in less than ten times the space which it was possible to obtain. It was, however, representative and in the highest degree characteristic, in that it included the most recent types and showed their adaptability to European conditions and methods. Our advancement in safety appliances was shown abundantly in air brakes, car couplers, and signaling, while the lowest freight rates in the world were explained by the enormous capacity of our cars and locomotives.

The most notable deficiency was in passenger equipment. There were no passenger coaches of any kind from the United States. Every possible effort had been made to secure them, but the difficulties were insurmountable. The bulk and weight of such cars makes shipment, if practicable at all, extremely expensive. There is no market for such cars abroad unless they are modified in a great many particulars. The measurable certainty that they would have to be returned to this country at the close of the Exposition added enormously to the expense. Nevertheless, one of the great railway systems did undertake to send a complete passenger train, more as an act of patriotism than anything else, but subsequently reversed its decision, as the difficulties seemed to

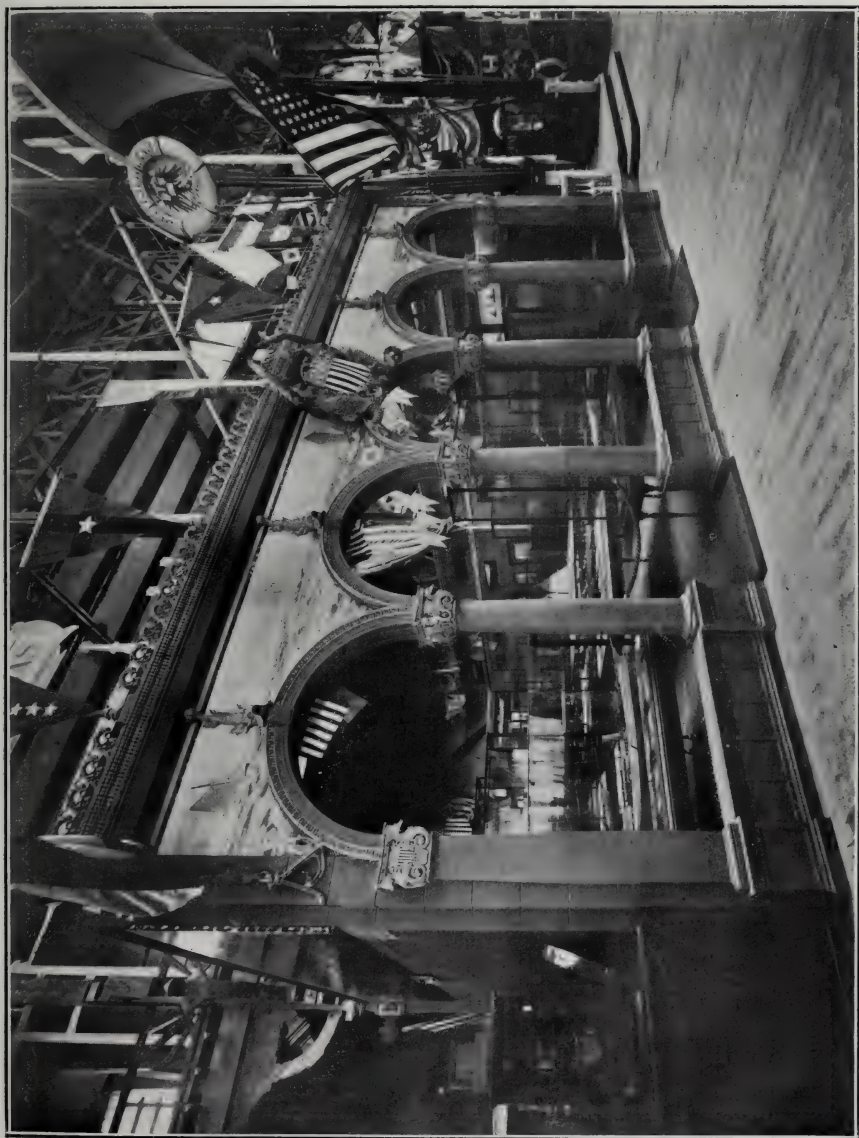
augment beyond all anticipation. Hence the only exhibits of American passenger equipment were numerous photographs of exteriors and interiors of all the principal limited trains. Especially notable were a fine large water color of the Pennsylvania Limited and colored photographs of the Chicago and Alton Limited. But if one were asked, "Where is your American passenger equipment?" he needed only to answer, "Look around you, in the British, French, German, Russian, Austrian, Italian, and other sections." Everywhere were dining cars, sleeping cars, etc., modeled after American plans and showing American influence in most of the details. Some of these were of full American size, 70 feet in length, provided with vestibules, air brakes, toilet, and heating appliances, etc. In comfort and elegance they equaled anything in this country, the chief difference being that the European idea of privacy is rarely abandoned and the compartment car with a corridor is the prevailing type, and that practically in operation these cars are only used in trains de luxe, on which the charges are by comparison enormous. The intelligent manufacturer doubtless observed that while American ideas are making their way, they are modified and changed to meet the practices and prejudices of the various countries. The influence of American practice also clearly appears in the enforced tendency toward the use of locomotives and freight cars of greater capacity, enforced by the fact that freight rates, now averaging in Europe three times as much for the same service as in the United States, are the object of general attack and must come down. Many American appliances were found on the locomotives and other machinery shown by nearly every European country.

The fact that the railway exhibits of all the heavier and more important kinds were located at the Bois de Vincennes, so far away from the main grounds, made it much more difficult to deal with exhibitors who never relish the "annex" idea. It was, however, the very size and importance of this exhibit that made a separate building necessary. The location was accepted by the commissions of the various countries, but only on the express understanding and agreement that all exhibits of this nature were to go to the same place. It was with no little chagrin, therefore, that the representatives of other countries found when the Exposition was opened that France had installed in the palace of civil engineering and transportation nearly all of her street-car exhibit and a number of locomotives and cars for steam roads. English papers had predicted that this would be done and had warned exhibitors.

The railway building at the Bois de Vincennes was of metal construction and perfectly adapted to the purpose. The United States section was near the center of the building, adjoining that of Great Britain on one side and Russia on the other. It consisted of a space 14 feet wide on each side of a broad aisle extending the entire length



E-13. STEAMSHIP MODELS OF THE AMERICAN LINE.



E-14. FAÇADE OF COLLECTIVE EXHIBIT OF AMERICAN YACHTING.

of the building. A track was laid centrally in the space on each side, connecting directly with the installation track outside the building. Light and air were good, and the location prevented its ever being crowded. What would have been a serious disadvantage to other classes of exhibitors was perhaps a direct advantage in this case. Engineers, railway managers, officials, and operators, and, in fact, all who had any special interest in such subjects took the time to go to Vincennes. While there they could and did examine the exhibit with care, free from the objection and annoyance of great crowds. Those in charge of exhibits doubtless found it dull at times; but, taking the season through, the opportunity for reaching railway men from all parts of the globe was unprecedented. Perhaps this was more especially true during the engineering congresses of June and July and the great international railway congress in September.

A small portion of the space in the United States section was vacant until about September 1, being held for exhibits which failed to arrive. At that time the space was reassigned and occupied by exhibits of a creditable character. Outside of the United States section a space of about 60 by 14 feet was occupied in the French section by a locomotive built by the Baldwin Locomotive Works for the State Railway of France. This location was at the request of the French Railway Company, and the exhibit was of course catalogued and treated as belonging to the United States section.

LOCOMOTIVES.

There were but three locomotives exhibited, all by the Baldwin Locomotive Works (Burnham, Williams & Co.), of Philadelphia. A locomotive built by the Richmond Locomotive Works for a railway in Finland arrived when the Exposition was half over, and being of 5-foot gauge, it was found impossible to install it. Two of the locomotives were of what is known in this country as the Atlantic type, and were built for a French railway company. The other was a mogul, built for the Great Northern Railway of England. All were Vaucrain compounds. The dimensions of the two installed in the United States section were as follows:

	French State rail- ways.	Great Northern of England.
Cylinders	17½ by 26	18 by 24
Driving wheels, diameter	84½	61½
Number of tubes	246	254
Tubes, outside diameter	2	1½
Fire box, length	120	72
Fire box, width	42	33½
Heating surface, tubes	1,925.4	1,260
Heating surface, fire box	170.4	120
Heating surface, total	2,095.8	1,380
Weight of engine	139,055	100,700
Weight on drivers	71,905	85,500

Following a plan previously used by them at the World's Columbian Exposition of 1893, the locomotives were jacked up so as to lift the wheels slightly from the track, and the wheels were then turned by the use of compressed air instead of steam. This was an attractive novelty, and when the whistle was blown and the wheels began to revolve the largest crowd in the building was quickly drawn to the spot.

The Standard Steel Works made an extensive exhibit of steel tires and steel-tired wheels in connection with the Baldwin Locomotive Works, the two companies being closely related in business.

FREIGHT CARS.

The only exhibit of freight cars was that of the Pressed Steel Car Company. It consisted of five cars: One self-clearing coal and ore car of 116,000 pounds capacity; a double hopper-bottom ore car of the same capacity; a gondola car of 40,000 pounds capacity; and two gondolas, one of 80,000 pounds and one of 50,000 pounds capacity, built for the Egyptian railways. The smaller of these was of narrow gauge. There were also shown a number of such parts as bolsters and truck frames. These cars are built entirely of plate steel and on plans which unite the maximum of carrying capacity with the minimum of dead weight. They have been in use only a few years, but have been so successful that their manufacture has reached enormous proportions. The great reduction in the cost of transporting freight in these cars in connection with locomotives of high capacity amounts almost to a revolution in the cost of carrying freight. Steel cars are no novelty in Europe, but they are small and light capacity. The principles involved in this design were recognized as correct, and it was generally acknowledged that they would be a great factor in reducing the cost of transportation. Not only the size but the low cost of these cars was a subject of wonder, the cost of work of this kind in Europe being very much higher than in the United States. The exhibit was constantly visited by railway men and engineers from all the principal countries of the world, and inspired renewed respect for American talent and resource.

An important exhibit of steel side-dump cars was arranged for with the Goodwin Car Company, but it was found impossible to complete the cars in time for installation. The device, was, however, shown by working models installed in the palace of civil engineering and transportation.

AIR BRAKES.

The New York Air Brake Company made an elaborate working exhibit representing the air-brake equipment of a train of 50 freight cars. The operation of the brakes for service and emergency stops was illustrated as requested. All of the various details of brakes for

freight and passenger cars and locomotive drivers were shown in the clearest manner. The whole exhibit was excellently planned and reflected credit upon the country where air brakes originated.

The Westinghouse Air Brake was shown in the United States section only on the locomotives. The foreign interests of this company are owned by a British company, and elaborate exhibits were made by them in the British section immediately adjoining the United States space. The Westinghouse brake being the first of all power brakes and being an American invention, it was decided by the jury to give the same award to the American company as to the British, although the principal exhibit was in the British section; a grand prize was thus placed to the credit of the United States.

COUPLERS.

The advancement in automatic car coupling in the United States has produced such remarkable results in saving the lives and limbs of employees and at the same time facilitating railway operation, that it is attracting great attention abroad. Both Great Britain and Germany have appointed Government commissions to inquire into the subject. The vertical plane or master car builders type of coupler is now almost in universal use in the United States, being practically required by law. The merits of the coupler itself seem to be thoroughly recognized abroad; but there is yet a question as to the proper means of attaching them to European cars, especially during the transition period.

The McConway & Torley Company presented a method by which the usual central hook is retained and couplers take the place of the buffer usually on European cars. Two couplers are applied on each end of the car and are used both for coupling and buffing. The same company also offered a method of attaching couplers centrally if preferred. They exhibited a large number of American couplers, showing a variety of sizes, styles, and adaptations. They are the owners of the Janney patents, the original of the entire type, and their prestige was recognized and confirmed by the jury.

The Gould Coupler Company exhibited, both by models and full-sized couplers and cars, a simple method of applying their couplers, which are in very extensive use in this country, to European cars. They are already in use in England and some other countries.

The National Malleable Castings Company showed two English freight cars with their Cleveland coupler. The system of buffing, attachment, etc., are ingenious and met with much favor. In all the methods shown the European hook is retained, so that cars can run in all trains without difficulty. Some couplers of the American type were shown in the Austrian section, the engineers of that country having given considerable attention to the subject.

SIGNALS.

The International Pneumatic Signal Company exhibited a large working model which was practically as effective as the full-sized device. It attracted attention and considerable approval owing to the fact that it gives a very perfect service with the use of air only, a power which is much less liable to interruption from extraneous causes than electricity. The system has been installed in important locations on several American trunk lines.

STREET CARS.

The J. G. Brill Company had an attractive exhibit of models in the palace of civil engineering and transportation, and of full-sized cars and appliances at Vincennes. A convertible summer and winter street car, an electric track sweeper, and a variety of trucks were all the subject of careful study by those interested in intramural transportation. Novel and practical features were included and the character of the workmanship explained to some extent the large export business of this company.

Other exhibits, all having points of particular excellence which were recognized by the jury of awards, were those of the International Brake Shoe Company; Galena Oil Company; Signal Oil Company; Fairbanks, Morse & Co. (Sheffield hand cars, push cars, velocipede car, and petroleum motor car); McKee, Fuller & Co., steel-tired wheels; the Christenson brake for street cars; Peckham street-car trucks; American Steel and Wire Company, wire fencing for railways, etc.

RETROSPECTIVE.

No attempt was made to send historical articles connected with the growth of American railways, but the mechanical and engineering history was represented by a series of some 35 large drawings, illustrating the development of the American locomotive, car, and railway bridge. The leading historical types were selected and the drawings were prepared with the greatest care and historical accuracy. The drawings were of uniform size and style, and really formed a very complete résumé of the history of this important development. Of the large collection of photographs already alluded to in connection with the engineering exhibit, a large proportion were of railway machinery, equipment, and structures.

Track materials were only represented by six exhibits of rail joints, tie plates, etc., shown in the engineering section of the palace of civil engineering and transportation.

POST-OFFICE MUSEUM EXHIBIT.

A separate building erected near the Champ de Mars and known as the United States Merchant Marine and Weather Bureau (annex) was

occupied exclusively by exhibits made by the United States Weather Bureau by direction of the Secretary of Agriculture and by a number of articles obtained from the Post-Office Department by the department of civil engineering and transportation. The building afforded a floor space of about 65 by 65 feet, one-half of which was allotted to the display of articles intended primarily to illustrate the transportation of the mails on land and water.

The models furnished by the postal museum in the Department at Washington comprised the following:

1. A model of a postal car, size 2 by 10 feet and 3 feet high, fully equipped with miniature distribution cases, mail-bag racks, and mail pouches and sacks, the whole illustrating in a perfect manner the the railway mail service.

2. A model of the steamship *Paris*, size 2 feet by 12 feet 11 inches, illustrating mail service on the sea.

3. Model of a Mississippi River steamboat, size 1 foot 3 inches by 4 feet 6 inches and 1 foot 8 inches high.

4. Model of a flat-bottomed steamboat used on the small and shallow rivers of the South and West, size 10 inches by 3 feet 4 inches by 1 foot 4 inches.

5. An old Concord stagecoach formerly used to carry mails and passengers in the far West.

6. Figure of an Indian mail carrier, dressed in buckskin and wearing showshoes, with a team of three dogs drawing a toboggan with mail pouches, illustrating winter mail service on some of the mail routes of northern Michigan.

7. A figure dressed in "cow-boy" costume and mounted on a horse, illustrating the carrying of mails on horseback on rural mail routes.

The jury for Group VI, class 32, awarded a grand prix to the Post-Office Department of the United States for this exhibit.

The Post-Office Department was not officially an exhibitor at the Exposition of 1900, and no space was assigned for the definite and exclusive purpose of a Post-Office Department exhibit. Request, however, having been made by the honorable Postmaster-General for the several articles above mentioned belonging to the postal museum and pertaining to the comprehensive subject of transportation, it was deemed expedient to supplement the exhibit intended to illustrate mail transportation by the display of other interesting objects which would convey an intelligent idea of our postal service in departments other than that of the transportation of the mails. Some of these which were found to be very interesting to visitors to the Exposition were as follows:

A complete collection of United States postage stamps from the date of their introduction in 1847 to the present time, including all official, newspaper and periodical, and postage-due stamps. These were artis-

tically displayed under glass in swinging frames affixed to the wall, and were especially interesting to numerous philatelists, who studied the collection minutely.

A complete set of post-route maps, on roller map rack, illustrating not only the geography and wide dimensions of the United States, but indicating in a striking and impressive manner the vast extent of our mail service and the frequency with which mails are sent into the most remote and sparsely settled regions of the country. No other country, we believe, has published maps of a similar character, and they were recognized by intelligent visitors to be unique, interesting, and instructive.

Models of a letter carrier and a special-delivery messenger on a bicycle, both in uniform, attracted much attention.

Also a curious collection, in two glass cases, of miscellaneous objects from the Dead-Letter Office which had been sent by mail and failed to reach the persons for whom intended. Several articles exposed in these cases were, during the season of the Exposition, identified by visitors as belonging to themselves or acquaintances, and information was given as to the proper method of proceeding to secure possession of the property. The last incident of this nature occurred the day before the closing of the Exposition, when an American lady, now residing in Paris, recognized a beautiful medallion portrait of a deceased niece, and was much rejoiced to be able to communicate the intelligence of her discovery to her family in Virginia.

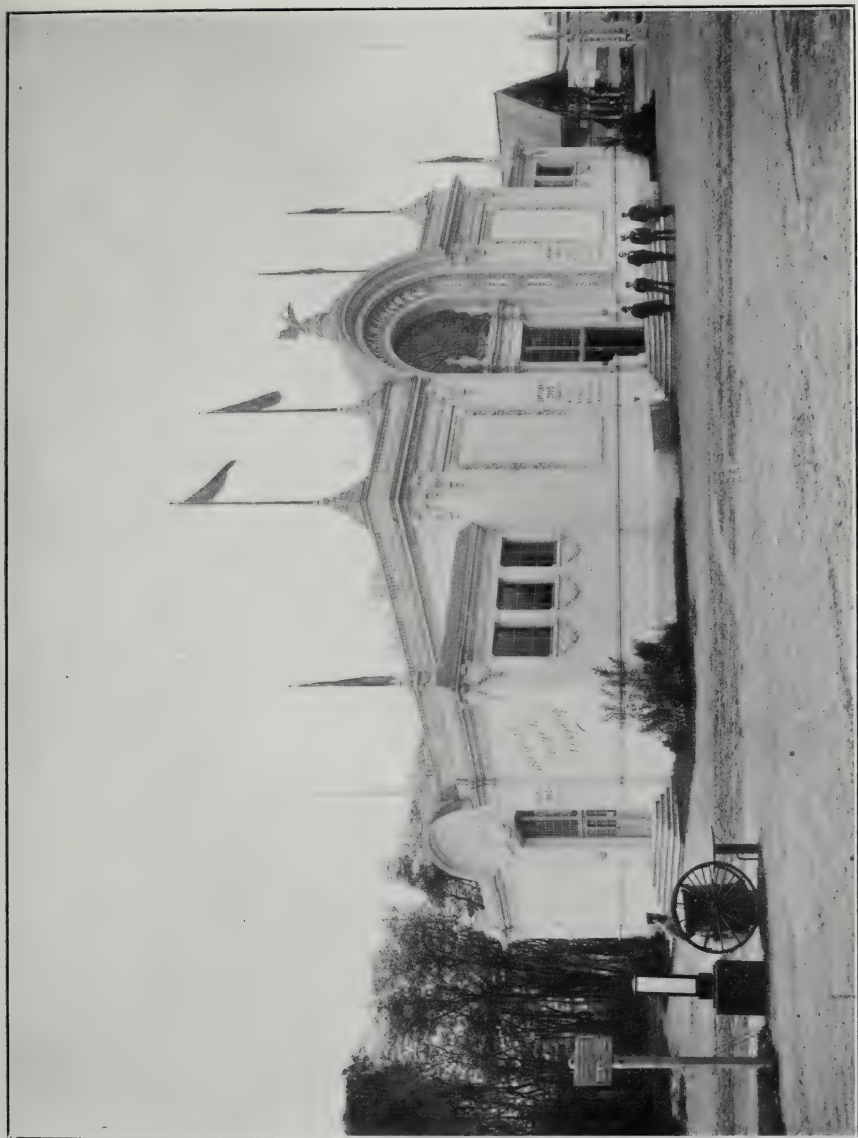
The collection of mail sacks and leather pouches and the mail locks used in our postal service, when viewed by experts in comparison with similar equipment used in other countries, compelled recognition of their superior quality, both as to material employed and excellence of manufacture.

There was great demand for a descriptive catalogue of the exhibit, and it is unfortunate that no such catalogue was prepared and printed for distribution to persons interested. This deficiency was, however, to some degree supplied by description cards, in the French language, attached to the principal objects of interest.

The only other postal exhibit at the Exposition having any pretension to completeness was an exhibit of postal cards and postage stamps, cancelling and dating hand-stamps and seals, street letter boxes, and small models, very prettily made, of mail wagons, which were exposed in a moderately sized case in the Austrian pavilion, in that part of the Exposition called the Rue des Nations, which was devoted to the national pavilions of different foreign countries. In one part of the Russian section there was exposed a full-sized post wagon and a post sledge, illustrating mail transportation in that country; and in some other foreign sections a display was made of postage stamps. But none of these foreign postal exhibits presented the interesting features



E-15. MODELS ILLUSTRATING HISTORY OF AMERICAN YACHTING.



E-16. UNITED STATES BICYCLE BUILDING AT THE BOIS DE VINCENNES.

of that of the United States, although our exhibit was in some measure incomplete. Almost every day during the season of the Exposition, especially during the hours of the afternoon, crowds of visitors thronged the building, and the interest manifested by both old and young in the postal exhibit was far beyond what might have been anticipated. Of course the greater number of visitors had no special knowledge of postal matters, but the exhibit presented features calculated to excite lively curiosity and an intelligent interest in that most important phase of modern civilization, the frequent and expeditious interchange by post of intelligence among people, however remotely separated. Some visitors who had given more or less attention to the subject would seek information in detail concerning our free-delivery and special-delivery service, and particularly our railway mail service, so aptly suggested by the large and admirable model of a postal car and also by the oil painting entitled "The flight of the fast mail." The great size of our postal cars, compared with similar cars in Europe, our express mail trains composed entirely of postal cars and traveling at a high rate of speed, and the enormous quantity of mail matter handled and worked in transit proved an interesting revelation to many inquirers; and the frequency of free delivery of mail by letter carriers in our cities and the promptness and expedition of our postal service generally are facts which disclosed to them in some degree the intensity and activity of our business and social life, which are in striking contrast with the slower and more deliberate methods which satisfy the demands of foreign communities.

The old Concord stage, which was in use for several years for carrying mails in the Rocky Mountains, and in which General Sherman, President Garfield, and President Arthur traveled when visiting that section of the country; the horseback mail carrier, and the Indian with toboggan and dog team, besides being objects of curiosity, and interesting historically, suggested many inquiries in regard to the western part of our country, its climatology, mineralogy, population, productions, etc.

In conclusion, I may say that the entire exhibit of articles obtained from the Post-Office Department proved to be extremely interesting and instructive to many thousands of visitors to the Exposition, and was appreciated by them as a valuable contribution to the general exhibit, official and industrial, sent from the United States.

WILLIAM A. BROWN,
Post-Office Inspector, in Charge of Exhibit.

CLASS 33.

This class comprised everything relating to marine matters, except those included in Group XVIII as naval, which were installed in the palace of the army of land and sea. The latter group, while under

the same director as this department, was kept distinct, and is reported upon separately. The exhibit of merchant marine included that of the International Navigation Company, a collective yachting exhibit, models of Ohio and Mississippi River towboats and barges, models of the whaleback barges used on the Great Lakes, model of a dumping barge, a gasoline launch, boat oars, St. Lawrence River pleasure skiff, Canadian-type paddling canoe, models of ferryboats, and a large collection of life-saving apparatus. The life-saving apparatus formed a portion of the Pollok prize exhibit, which is separately reported upon.

The exhibit of the International Navigation Company consisted of models and photographs illustrating the trans-Atlantic passenger traffic of this great steamship line. The installation of this exhibit was very beautiful and artistic. The façade consisted of columns supporting arches, in the spandrels of which was a bronze casting of New York City and Harbor showing models of vessels, illustrating the development of steamships since 1851. The *St. Louis*, of that line, appeared as going into the harbor and the *New York* going to sea. Marine emblems ornamented the top of the façade and the columns, and it was draped with American flags and with the flags and signals of the company. The interior of the room, which was decorated in sea-green stuffs, contained principally four fine steamship models, constructed to scale, showing the types of steamers in the American and Red Star lines.

The exhibit of American yachting was historical in character and entirely unique. American supremacy in this class of scientific sport is necessarily acknowledged, and this admirable representation of its past and present was a mecca for all visitors to the Exposition who were in any way interested in the general subject. The collection of models, photographs, etc., was made by Mr. John R. Buchan, of New York, an amateur expert. Most of the models belonged to private owners, who prized them highly and were reluctant to let them go out of their personal keeping. Mr. Buchan's influence with the New York Yacht Club and such of its prominent members as Mr. J. Pierpont Morgan and Mr. Oliver Iselin, and the cooperation of Mr. J. Malcolm-Forber and General Paine, of the Eastern Yacht Club, made it possible to secure the most interesting of existing models. It was desired to show the development of the American yacht, and a complete set of models of the successive cup defenders. The New York State Commission for the Paris Exposition heartily cooperated, and besides paying a considerable portion of the expense of collecting and storing material, provided for the cost of making several models for supplying missing links in the chain. In order to secure the loan of valuable models it was necessary that Mr. Buchan pledge his personal care of the same. The Commissioner-General, appreciating the novel char-

acter of such an exhibit and the patriotic pride which it would engender, provided that Mr. Buchan should accompany it to Paris, install it, and finally superintend its return and distribution. This duty was performed with fidelity and the results were all that was anticipated.

The exhibit was separated from the main aisle by an artistic façade designed by the director of decoration, John Getz, and Mr. Taft, which appear clearly in the photograph. The oil paintings representing types of American yachts under full sail in New York Harbor were by Chapman. A figure of Neptune supported by dolphins and holding in his outstretched hand a model of the yacht *America*, surmounted the center of the façade. The interior was decorated in light sea-green color, and the walls were covered with half models, photographs of yachts in motion, oil paintings, etc.

In view of the unique character of this exhibit and the interest which was manifested by both Americans and foreigners, I have secured from one of the best authorities a history of the development of American yachting, which is herewith given.

A model of each of the yachts named was exhibited, except the latest, the *Columbia*. For obvious reasons the lines of this famous yacht are still kept secret. It was represented only by photographs of it in the water, which of course did not reveal the most important part of the construction.

THE EVOLUTION OF THE AMERICAN YACHT.

[By A. Carey Smith.]

The America.—There is nothing to add to the record of this remarkable vessel. A few words, however, may be said about her elements.

The midsection was a straight line from the intersection of the keel to the turn of the bilge, which was very near the water, and the greatest beam was above this line.

This peculiar form at water line can not be departed from even at this modern day. The keel showed a pronounced drag and the draft aft was about twice what it was forward, and the sternpost was perpendicular to the water line. The masts had a great rake, as was then the fashion. The bowsprit was very short, and the jib was laced to a boom. The foresail was lugged aft the mast, exactly as is the custom to-day. The main gaff was very short and the mainsail was laced to the boom. There was no foretopmast. The rigging was the simplest possible. The absence of all gear, combined with a form that did not disturb the water when heeled to the planksheer, enabled her to go to windward in an astonishing manner.

The ballast was of iron and molded to shape.

It was the privilege of the writer to see the *America* frequently while building, and also in her trials with the sloop *Maria*, at that time the fastest boat in the country.

For a number of years no vessel came to sail for the cup until Mr. James Ashbury made his appearance in the *Cambria*. This trip no doubt was brought about by her defeat of the *Sappho* in English waters.

To make matters clear later on, a few words may be said about this meeting. The *Sappho* was taken to England and tried with the *Cambria*, and was badly beaten. She was then purchased by William P. Douglas, esq., who put her in the hands of the late Robert Fish, who was a master at getting large vessels into racing form. The plank was stripped from the hull from well below the bilge to the plank-sheer. The frames were then padded out about 15 inches at mid section and faired off to nothing at each end; this made a pronounced tumble home at mid section, but as this was then the fashion it looked well enough. This fullness was carried down to make a fair line with the lower part of the boat and replanked. The iron ballast was taken out and lead put in. The mainmast was shifted forward 4 feet and the whole sail plan was made to suit the new conditions.

The *Sappho* was then taken to England, and after numberless trials, in which nothing but the native force and courage of Bob Fish could have achieved success, was put in racing form and defeated the *Cambria* and all other vessels. This gave a prestige to American yachts that was sadly wanting at that time. Bob Fish was not a regular sailing master, but a builder of great talent who had been reared in the "sand bag" school of racing, and who carried out in large vessels what he had learned with small ones.

The *Cambria*, though beaten, had engaged to come over and sail for the cup. The *Cambria* was a true English model—narrow, deep, and of large displacement, and manned by a stalwart crew that made us open our eyes at the way they could make topsails stand to windward in a breeze.

In strong breezes to windward in short work she fully made good her reputation. The race was started from an anchor with sails down, as was then the custom of the New York club. It was held that this was a test of the men as well as of the vessels. The race was participated in by a whole fleet and the *Cambria* was given a good position to windward, but the wind shifted just before the time for starting, placing the *Cambria* to leeward. When the signal was given the yachts had to get up sail, swing around, and start. The tide was ebb, and the advantage was with the smaller boats, of which the *Magic* was handled with consummate skill. Her sails went up like magic, and off she went, led around the Spit to the strains of "Yankee Doodle," and won the race with ease. The *America* had been rejuvenated for this occasion by the Navy Department and put in as near her old form as was possible. Old as she was, she fully upheld her reputation.

The *Magic* was a schooner of 78 feet 6 inches on water line, 20 feet

beam, and 6 feet 7 inches draft. She was the result of judicious alterations and was the property of Franklin Osgood, esq., a keen sportsman, who gave his personal attention to every detail and spared neither time nor trouble, and always makes his boats sail well. Hulls, sails, and ballast shared his attention. The latter was put in and taken out until the best results were obtained.

The *Magic* had a cross section somewhat like that of the *America*—that is, the bilge was slightly below the water line and went from this point to the keel with a slight hollow, and though she was a center-board boat she had nearly a foot of keel outside the garboards. The forward body showed a hollow water line and the fore body was carried out with great judgment. The after body was a gradual diminish of the mid section and ended in a short counter stern. The stern post was plumb and there was considerable drag to the keel. The scantling was the ordinary vessel construction of that day, double frames throughout and ceiled up inside with thick ceiling.

During this race the *Sappho* was made out coming into the Hook under full sail on her return from her triumphs in England, where she had squared accounts with the *Cambria*. Nothing could be more opportune than her arrival. She was greeted with roaring cheers and screaming whistles. The English crew were astonished at the greeting and thought that people had gone crazy.

The *Cambria* went on the cruise of the New York Yacht Club and was entertained in royal style.

The owner of the *Cambria* was not satisfied with his defeat, and soon sent a new challenge cumbered with a great many lawyer-like conditions. The *Livonia* was the vessel put forward to carry his flag. She was a larger vessel than the *Cambria* and showed that American yachts had been to England.

The *Columbia* was one of the vessels selected to meet the challenger. At that time one vessel was not selected as a champion; the club claimed the right to name a vessel the day of the race.

The *Columbia* was a vessel then owned by Franklin Osgood, esq., and was built at Chester, Pa.

She was 96 feet on water line, 25 feet beam, and drew only 6 feet of water. Her mid section was very full and flat. She was a well-modeled boat for those dimensions, very stable in smooth water, and was a very successful boat in her day. She was right from the start and was reputed a great performer.

She was built of regulation scantling, heavy double frames, planks partly fastened with spikes and partly with treenails wedged on the inside of the thick ceiling, had deck beams of large size about 6 feet apart, with a lodge and bosom knee and hanging knee on each one, and there was a small carline between each beam to take the strain of calking the deck.

She was orthodox in every way in both hull and rig. Her keel was straight from the plumb sternpost to the slight round-up of the fore-foot. She was rigged with one big jib and flying jib, and had a boom foresail and mainsail with long boom and rather short gaff.

The first race was won by the *Columbia* and the second also, but the third was lost owing to a breakdown of the steering gear.

The *Sappho* was then selected to meet her, and defeated the *Livonia* with great ease. The race from the start was a procession, for the reason that the *Livonia* was a poor copy of American ideas as expressed in the *Sappho*.

The next candidate was the *Countess of Dufferin*, from Canada. This vessel had a very long fore body and sailed well down the wind, but in a race to Block Island was badly beaten to windward by the old *America*. The *Madeleine* was selected to meet the *Countess of Dufferin* after a series of trials.

The *Madeleine* is a schooner of 95 feet water line, 24 feet beam, and 7 feet 4 inches draft. She, like the *Magic*, was the result of well-planned alterations, and is to this day a good performer down the wind. The midsection is on the same principle as that of the *America*—straight from keel to turn of bilge, which is almost at the water line, and the greatest beam is above the water line. The fore body is long and well molded, and the after body is well carried out and ends in a well-shaped counter stern. The *Madeleine* was rigged with a single jib and flying jib, boom fore sail, and mainsail of ordinary cut. When she raced she carried a fore club top sail in addition to her other sails, that did yoeman's service in reaching.

The *Madeleine* was built in the old way, of fair-sized scantling. The idea of light construction had not yet entered the minds of builders. The backers of the *Countess of Dufferin* after her easy defeat were not dismayed, but made up their minds to try again, and sent the *Atlanta*, a sloop-rigged vessel, to compete for the cup. The sloop *Mischief* was chosen to meet her after a series of trials.

The *Mischief* was an iron boat, made without regard to lightness, and was the first boat to defend the cup made from a drawing-board design. She was 61 feet long, water line, 19 feet 10 inches beam, and 5 feet 4 inches draft. She had a full midship section, with round bilge gradually turned into a straight line at the keel, and the beam was above the water line.

The displacement of the fore body was a curve of versed sines and that of after body was a trochoidal curve. She was of large displacement and was ballasted with lead molded with great care to fit the shape of the boat, and was put in order by her owner, the late J. R. Bush, esq., with a care for the least detail that could not be surpassed. She was manned by Americans, many of whom have since made a high mark in their calling.

The rig of *Mischief* was the old sloop rig, with a tall mast and single jib. The area of sail was large, but she carried it without trouble. The first race was won with ease by the *Mischief*. The second was over a course from Sandy Hook seaward and return, 15 miles. When the race was started, the committee boat waited to time the *Gracie* and for some time the *Mischief* had to steer by compass for the outer mark. The wind was well aft and quite fresh. The *Atlanta* was reefed, while *Mischief* carried full sail. When the mark was near, the *Mischief* was also reefed, and this delay brought the *Challenger* close up, but the moment the mark was turned the *Mischief* went to windward in a manner that put all fears about the cup at rest. The *Mischief* won by some forty minutes, and defeated the *Gracie* also, a boat 9 feet longer on load water line.

The next challenger was the *Genesta*, a typical English cutter. As there were no boats of her size to meet her, two boats were built—one the *Puritan*, by a Boston syndicate, and the other the *Priscilla*, by a New York syndicate. The *Puritan* was designed by Mr. Edward Burgess and the *Priscilla* by the designer of the *Mischief*. The *Puritan* was the better boat, and was selected after a series of interesting trials at Newport and New York.

The *Puritan* was the first boat designed with a view to lightness of construction. She was 80 feet on water line, 23 feet beam, and drew 8 feet 2 inches. Her midsection showed a faint bilge very close to the water line, and there was considerable hollow where it met the keel. The latter was moderately deep and had a major proportion of the lead ballast on it. The whole boat was beautifully molded and was a credit to the designer and his backers.

There was the least possible ceiling inside, and the deck fittings were the lightest possible. The rig was that of a cutter, short mast, long topmast, jib set flying, and large mainsail with long gaff. The top sail was laced on, after the English style. The rig was a combined English and American one and showed good judgment in its selection. The *Puritan* defeated the *Genesta* in three races. The finish of the last one was dramatic in the extreme. Just before the finish a fierce squall struck; *Puritan* doused her working topsail, while *Genesta* hung on to hers. When the boats were hidden from view the *Genesta's* topsail was slatting so that it shook the whole boat. During the squall the centerboard boat worked out to windward of the cutter and defeated her by a narrow margin.

Boston went wild over this victory, and honors were showered on the young and modest designer, who was a most genial fellow and beloved by all who had the pleasure of meeting him.

The next challenger was the *Galatea*, Lieutenant Henn, designed by the designer of *Genesta*, Mr. J. Beaver Webb. To meet her Mr. Burgess brought out the *Mayflower* with the same backing as before,

led by the veteran Gen. Charles J. Paine. The *Mayflower* was a great refinement on the *Puritan*, and showed improvement in both construction and design. The dimensions were as follows: 85 feet long water line, 23 feet 6 inches beam, and 11 feet 6 inches draft. The midsection was similar, but much deeper and much cut away just at the water line. The fore body was long and very little hollow, while the after body was nicely molded and finished up to a fine cutter stern. The scantling was much reduced, and all fittings were lightened up. There was also much more lead on the keel and more canvas. When she was tried she was very tender, but sailed well. General Paine at once began to reduce all weights above and aloft and finally got her in real racing form. She was a beauty to look at. The rig was the same as that of the *Puritan*, but with many changes for the better. When she met *Galatea* it was soon decided that *Mayflower* was the better boat.

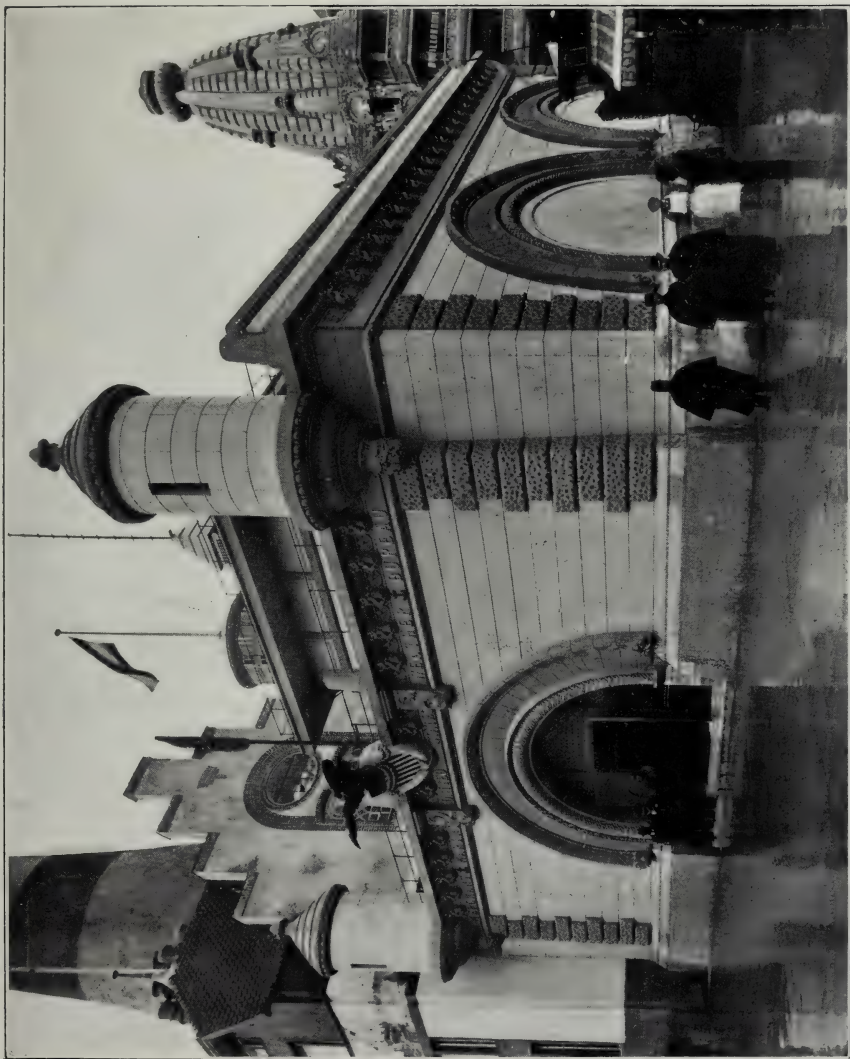
The *Thistle* then came across to compete for the much-coveted cup. This was a George L. Watson boat, and if looks had decided the contest, the cup would have been given to her at once. This time General Paine built the *Volunteer*.

General Paine had given personal attention to all the details of *Puritan* and *Mayflower* and brought his experience to bear on the *Volunteer*, whose points and the departures from the *Mayflower* showed his genius. Added to this was his talent, developed during the war, for controlling men.

The *Volunteer* was a deeper boat at the center of length than the *Mayflower*. Her midsection was fuller and she had a long "straight of breadth" and more displacement, so much more that she did not come down to the designed water line by 4 inches. The general found she sailed well at this line and wisely let well enough alone. She was 85.8 on water line, 23.2 beam, and 10 feet draft, and had great weatherly qualities. She was right from the start and would stand the main sheet jammed in as flat as the crew could pull it, and go to windward in weather that other boats could not look at. She was built of steel, and there was not special lightness about the hull when turned over to General Paine; but he removed some deck beams, also the plates on the sides of the centerboard trunk above water, and generally lightened her up with a merciless hand.

When the day of battle came the *Thistle* was wheeling about the starting line in the paltry breeze in a way that boded ill for the *Volunteer*, but when the start was made and both boats jammed their sheets down the *Thistle* simply stopped, while the *Volunteer* bested her in a single tack. The race was a procession.

These races were the first that the public really turned out to see. On the way home, as the *Volunteer* passed the steamboats, keeled over with one wheel out of water and black with people and with a white fringe of waving handkerchiefs, roars of cheering swept the boats like



E-17. MERCHANT MARINE ANNEX. OCCUPIED BY EXHIBIT OF THE UNITED STATES POST-OFFICE DEPARTMENT AND THE WEATHER BUREAU.



E-18. MODELS ILLUSTRATING TRANSPORTATION OF THE MAELS, UNITED STATES POST-OFFICE DEPARTMENT.

a ground swell breaking on the rocks. It showed how the people had taken the "cup" contest to heart. In fact, the desire of the people to see the race was such that steamboats were brought entirely too near the racers, and the bow waves from steamers "washed" both boats and interfered with their progress; and, what was worse, the stern boat received the most "wash."

The next race was from outside the Hook. There was a moderate wind and lumpy sea. At the start the *Volunteer* weathered on the *Thistle* and showed that she had the race well in hand. The lead around the outmark was about sixteen minutes. On the way home the *Thistle* decreased the time considerably, but the margin was too great.

The next challenge came from the *Valkyrie*, designed by George L. Watson. To meet her the *Colonia* and *Vigilant* were built by the Herreshoff Company, of Bristol, R. I., and Mr. C. Oliver Iselin placed in charge. It was now for the first time that a real advance was made in both design and construction. The Herreshoff Company was both designer and builder, and had behind it many years of experiments with all kinds and shapes of boats.

The *Vigilant* was a wide departure from all yachts of this class. Her bow had a long overhang, with no pretense of a figurehead. The stern was likewise carried out to an extreme logical ending of the lines of the after body. Her dimensions are as follows: 86 feet 2 inches long on water line; beam, 26.2, and 13.3 feet draft, with a bronze centerboard of 3 tons weight. The midsection was a gentle curve from the deck; that is, the beam was about the deck, the side going to the water line with a gradual curve, turning into the bilge just below that line, and then nearly straight to a sudden curve where the line goes into the keel. This sharp hollow is carried from where the bow merges into the keel to the sternpost. This is a noticeable feature of this model. Below this the line goes straight to the round at the side of the bottom of keel. The sternpost has a slight rake and the draft is greatest at the sternpost. From here the keel rises gradually, but in a straight line to the forefoot.

The rig was a modified cutter, with the forestay at the end of the bow, and the jib was set flying. On this boat for the first time several suits of sails were fitted and the best chosen. The canvas was made to order and no money or trouble was spared to get the best. The rigging was of the best steel and the sizes were cut down to the limit of strength, so much so that one day the bowsprit shroud carried away and took the bowsprit and topmast out like a flash of lightning. This was the proper way to arrive at the strength of rig for such a boat.

The hull was constructed of Tobin bronze and the part below water was polished like a mirror. The races this time were sailed outside of Sandy Hook, in order to give proper room and scope for the racers and large fleet of steamers that went to see the pageant.

The interesting race was the last one to windward in a strong wind.

Both boats were reefed and the *Valkyrie* had the better of the argument and turned ahead, but made the fatal error of running well off, so that a clear place was left for *Vigilant* to get by. When the turn was made a man was hoisted up by a whip from the topmast and hauled out by a guy line to the end of the boom, cutting the points as he went out while the crew cut the inner points. The reef pennant was then cut and up went the mainsail. At the same time the balloon jib topsail was set, and the spinnaker followed. The wind would cock the spinnaker boom up nearly on end, then the wind would rush into the jib topsail. After this the club topsail was sent up, but could not be properly set, but it was well clear of the halliards and pulled like a young elephant. All this time the *Valkyrie* had a small jib topsail set that did little good, and when the spinnaker was set it was not stopped with rope yarns and when partly up its wild gyration caused a hook or bolt to catch in it and it split to ribbons. Another smaller one shared the same fate. Then the *Vigilant* was allowed to get by and won a race that at the mark was in the hands of the other boat.

The next challenger was a second *Valkyrie*, made expressly for the weather and climate conditions—in fact, a more American boat than the one that was opposed to her. The *Defender* was then built by a syndicate of New York gentlemen, and Mr. C. Oliver Iselin was placed in charge. This vessel was designed and built by the Herreshoff Company and was a great advance on the *Vigilant*. The dimensions are as follows: 88.44 feet water line, beam 23.3 feet, draft 19 feet. This vessel differed in the matter of beam from the *Vigilant* by nearly 3 feet, and she was much deeper and had no centerboard.

The forward part of keel was more cut away and the sternpost had more rake and was placed considerably more forward of aft end of water line. This gave much less surface, and the radius of turning when tacking or wearing was much shorter.

The midsection was very different. The side was perpendicular and the beam was just above the water line, and the turn of bilge was not so easy as that of the *Vigilant*, while the line of bottom was much deeper before it turned into the keel. This form was skillfully blended from bow to stern. The bow was a long, gradual convex line, and aft the curve was much fuller, but of the same character. The bow had a smoothly graduated sharpness, yet was not flat at any place. The frame at the stern had a suggestion of the midsection in it and aft the round of the bilge showed at the extreme end of the quarter.

The model was beautiful to look at, even to the eye of a layman. The form suggested speed. It was like a beautiful piece of sculpture. The construction of the hull was as perfect as the form of the boat. The plating was Tobin bronze below water and aluminum above, and the same metal was used for the deck beams and stringers. The sails were made by the designers, of stuff that no pains were spared to get

perfect. The mainsail was crosscut and the topsail on the same principle. The jibs were made after a pattern of the designer. When tried, this vessel beat the *Vigilant* in a strong breeze in the most hollow manner, standing up under a club topsail when the *Vigilant* could not carry any topsail, and, while the angle of keel was not great, the apparent power of the vessel was remarkable. She looked what she was, the perfection of a sailing machine.

The first race with the *Valkyrie* showed that though the *Defender* was a marvel her adversary was nearly equal to her. In a light breeze to windward they sailed for miles without any gain on either side, but about 3 miles from the mark the outhaul on the mainsail was slacked in a few inches, and from that moment the *Defender* opened a gap and down the wind added to it every foot of the way. Captain Haff had learned some tricks about trimming sheets when reaching that had not been learned on the other boat.

There was an unfortunate foul on the next race that was deplored by everyone, and the race was a great disappointment for all who saw it. The race was given to *Defender*. The next race was called, but the *Valkyrie* did not cross the line. The *Defender* went over the course; and thus closed a most painful incident.

The next candidate was the *Shamrock*, from the board of William Fife, a designer who had made many beautiful boats, some of which had won great fame and taken many cups away from us on our own ground. To meet this vessel the *Columbia* was built by the builders of the *Defender*. This vessel was an improvement on the *Defender*. Her dimensions were as follows: 89.66 feet water line, 132 feet on deck, 24.2 feet beam, and 19 feet 10 inches draft.

The vessel was designed to heel over more than the *Defender*, and was, in a general way, a great improvement on her. The keel is shorter, and the sternpost is more forward than that of the *Defender*. This brings the lateral resistance more forward and allows the mast to be slightly more forward, and smaller head sails. The midsection had a slight tumble home, and the bilge was just below the water line and, viewed from a dry dock, was carried out in a fair curve from stem to stern. The line from the bilge to where it turns into the keel was carried rather deeper than in the *Defender*, and this form was carried out fore and aft. The sternpost had a good rake, and this and its position in relation to the aft end of water line made the keel very short. This feature with a boat with a flatter midsection would have been fatal, but the model shows that no condition had been overlooked. The center line of overhang below the water is quite a sharp hollow, to accommodate the fullness near the keel. This fullness is notable, and is different from the former boats, and gives a lower center of buoyancy. This latter point is where the difference is between this vessel and the *Shamrock*, whose deep, round bilge and hollow near the keel

killed her when heeled to a strong wind, and defeated her at the very moment that her friends were most sanguine of success. This is more surprising when we consider that all of the early boats of the designer of *Shamrock* are very conspicuous for the very opposite form at this point.

The *Columbia* is plated with Tobin bronze, and no aluminum is used in her top side, as it proved to be treacherous on the *Defender*.

The general form of the *Columbia* is, from an artist's point of view, a great improvement. There is a refinement and justness of form—in fact, a sensuousness that belongs to a statue. This beautiful form, when the elements are right, makes the perfect boat.

The rig is as great a success as the hull. The tall steel mast that can be held in place; the tall and comparatively narrow mainsail does not strain the masthead so much. The steel boom elaborately braced, the main-sheet blocks hung on long slings, and the disposition of the blocks on the deck shows the strain of such a wide spread of sail is properly held, and each block has the proper pull. The head sails are small, the bowsprit also is short, and the whole fabric shows the keen appreciation of every detail that bears upon the success of the perfect sailing machine.

When the final races were sailed all of these points were demonstrated. The *Shamrock* showed a topsail more sail, but the *Columbia* was pressed down in the water and went through it with less motion, and the convincing speed showed the justness of all the details of this wonderful boat that none can really appreciate but those who have trod the stony path of naval architecture. There we find something every day that shows that there is more to be learned.

REPORT OF THE ARMY AND NAVY EXHIBIT, GROUP XVIII.

LIST OF PLATES FROM PHOTOGRAPHS.

- E.-20. Naval exhibit, showing central pavilion crossing main aisle.
- E.-21. Models of battle ships of United States Navy.
- E.-22. Models of battle ships and cruisers and gunboats of United States Navy.
- E.-23. Models of protected cruisers and gunboats of United States Navy.
- E.-24. Electrical naval machinery and appliances.

SPACE IN GROUP XVIII.

Palace of Army and Navy:	Square feet.
Total area, including obligatory aisles.....	4, 234
Net exhibit space.....	3, 504
Circulation	1, 950
Net floor space, covered.....	1, 554
Wall space.....	2, 420

In April, 1899, it was ascertained by the United States Commission to the Paris Exposition of 1900 that the European powers had declined to participate officially in the display to be made in the military

and naval section of said Exposition; but in June of that year the Commissioner-General for the United States was informed from the Paris offices that the Russian Government had decided to make an official display, and that Germany would make a retrospective exhibit of army uniforms; also that individual contractors for uniforms, accouterments, and certain war material might exhibit their product in this section, and that, while the French Government would not make an extensive display, the minister of war had determined to make a retrospective exhibit and to permit manufacturers of war material and accessories to display the same.

Almost coincidently with the above announcements from Russia and Germany, the United States Commissioner-General was notified that the French Exposition authorities were looking to the United States for a particularly interesting exhibit in the Army and Navy group; and on June 9, 1899, the management of the affairs of the United States section of this group (XVIII) was placed under the authority of Mr. Willard A. Smith, director of the department of civil engineering and transportation.

A space for installation approximating 4,000 square feet was allotted to the United States on the lower terrace of the Army and Navy palace, Quai d'Orsay.

Immediately after this steps were taken by means of correspondence and personal conference with the heads of the War and Navy Departments to secure the cooperation of these Executive Departments of the United States Government in making the most complete and attractive exhibit possible. The War Department decided, however, to decline participation, principally because of lack of funds available for the expenses of collecting and preparing articles for display; and, in the end, was represented officially only by an exhibit furnished by the Chief Signal Officer. The Navy Department agreed to permit to be taken for display such articles under its control as were considered of greatest interest and importance, the nucleus of the exhibit to be the models of the various classes of vessels built or building for the naval establishment, with the understanding that the United States Commission to the Paris Exposition should bear all the expenses connected with the preparation, transportation, display, and return of the objects selected.

Nothing further was done in the way of preparation, beyond selecting a number of models and submitting their names to the Secretary of the Navy for approval, until October, 1899. On October 4, 1899, the Secretary of the Navy, at the request of the Commissioner-General, detailed Lieut. H. C. Poundstone, United States Navy, for charge of the United States naval exhibit at the Paris Exposition and other duty in same connection. This officer reported to the Commissioner-General on October 6, 1899, and was assigned as in immediate charge,

under the director of the department, of all matters pertaining to the selection, preparation, collecting, and transportation of military and naval exhibits. The scope of intended display was enlarged to include such loan exhibits as might be secured from firms which manufactured war material, appliances, and accessories for the United States Government.

For the proper prosecution of this work the officer in charge was directed to make his headquarters at Washington, D. C., and to perform such travel from time to time as might be necessary.

The exhibit as finally collected and installed was as follows:

Class 116.—Department of the Navy, Bureau of Ordnance: Photographs of naval gun factory and of service arms; models of steel rifles; sample cartridge cases, cutlasses, and sword bayonets.

Class 117.—Department of War, Signal Corps United States Army: Photographs of field operations during Philippine insurrection; field telegraphs and telephones; signal flags; field signal apparatus.

Class 118.—(1) American Ship Windlass Company: Model of steam capstan.

(2) Babcock & Wilcox Company, New York: Photographs and plans and a forged steel header of the Babcock & Wilcox water tube boilers of the U. S. S. *Chicago* and the U. S. S. *Atlanta*.

(3) Bethlehem Steel Company, South Bethlehem, Pa.: Photographs illustrating the manufacture of armor plate, ordnance, and hollow or solid forged shafting, and general forgings and castings. Chicago, 1893, medal.

(4) Blake (George F.) Manufacturing Company, New York City: Model of a Blake vertical twin air pump.

(5) Bowles, F. T., naval constructor, United States Navy: Full-size working model of an electrically operated water-tight door.

(6) Flagg, Ernest, architect, 35 Wall street, New York: Drawings and photographs of the buildings and grounds of the United States Naval Academy, Annapolis, Md.

(7) General Electric Company, Schenectady, N. Y.: Photographs of electrical apparatus manufactured for the United States Navy and the United States Army.

(8) Hichborn, Philip, Chief Constructor, United States Navy: Models of barbette turret for 12-inch breech-loading rifles and of Franklin life buoy.

(9) Holland Torpedo Boat Company, New York City: Model of Holland submarine torpedo-boat type 7, 1900, designed to run at the surface or submerged.

(10) Melville, George W., Engineer in Chief, United States Navy: Model of a water-tight door, designed to be operated by hand or power.

(11) Department of the Navy, navy-yard, New York: Photographs showing the equipment and facilities of the navy-yard.

(12) Department of the Navy, Bureau of Ordnance: Electric motor for ammunition hoist, rammer, or elevating; photographs showing manufacture of and practice with automobile and spar torpedoes.

(13) Department of the Navy, Bureau of Construction and Repair: Models and photographs of naval vessels, full and in sections; models of ship appliances; photographs of United States naval vessels; naval electrical apparatus.

(14) Department of the Navy, Bureau of Equipment: Standard marine electrical apparatus and accessories, furnished by General Electric Company; samples of rope, flags, pennants, and signals.

(15) Department of the Navy, Bureau of Steam Engineering: Photographs, drawings, and blue prints of engines for United States naval vessels; model of beam engine of a Pacific mail steamer.

(16) Department of the Navy, Bureau of Navigation, Naval Academy: Photo-

graphs illustrating characteristic phases of cadet life and training at the United States Naval Academy, Annapolis, Md.

(17) Page Bros. & Co., Boston, Mass.: Marine electrical fixtures, United States Navy standard.

(18) Roelker, H. B., 41 Maiden lane, New York: Photographs of Allen dense-air ice machine, as supplied to vessels of the United States Navy.

(19) Sellers, William, & Co., Philadelphia, Pa.: Model of a 40-ton locomotive dock crane; capacity, 64,000 pounds at 70 feet radius; highest hook position, 56 feet above rails; track gauge, 18 feet; trucks equalize load on wheels and travel round on cover of 66 feet radius. Paris, 1867, gold medal; Vienna, 1873, diploma of honor and five medals; Philadelphia, 1876, three medals; Paris, 1889, grand prix.

(20) Steele, W. F., New York: Photographs of gas plant installed in forge shop of United States Naval Gun Factory, Washington, D. C.

(21) Williamson Brothers Company, Philadelphia, Pa.: Model of steam steering gear.

Class —. — (1) Department of the Navy, Washington, D. C.: Miscellaneous publications relating to Arctic exploration, canals, dockyards, gun foundries, and armor factories.

(2) Department of the Navy, Bureau of Equipment: Publications showing the flags of maritime nations and the international code of signals; patent log; sounding apparatus.

(3) Department of the Navy, Bureau of Equipment, Compass Office: United States Navy standard compensating binnacle, complete with correctors; Pelorus.

(4) Department of the Navy, Bureau of Equipment, Nautical Almanac Office: The American Ephemeris and Nautical Almanac from 1855 to 1902.

(5) Department of the Navy, Bureau of Equipment, Naval Observatory: Photographs of buildings and instruments, records of astronomical observations, navigation instruments, observatory time.

(6) Department of the Navy, Bureau of Equipment, Hydrographic Office: Publications relating to hydrography, meteorology, and navigation; chart construction; characteristic charts; relief map.

(7) Department of the Navy, Bureau of Navigation: Report of the chief of bureau for 1898 and appendix to same.

(8) Department of the Navy, Bureau of Navigation, Office of Naval Intelligence: Publications—General information series; coaling, docking, and repair facilities of the world; war notes; war series.

(9) Negus, T. S. & J. D., New York: Marine chronometers; conning tower binnacle; torpedo boat compensating binnacle.

(10) Pain's Fireworks Company, 12 Park place, New York City: Series of life-saving and signal rockets and signal lights.

(11) Ritchie, E. S., & Sons, Boston, Mass.: Instruments of navigation, consisting of compasses, azimuth circles, pelorus and magnetic instruments.

Class —. — (1) Quartermaster's Department, United States Marine Corps: Uniforms, arms, and accouterments of the noncommissioned officers, enlisted men, and bandmen of the United States Marine Corps.

(2) Department of the Navy, Washington, D. C.: Seal of the Navy Department; medals voted by Congress to United States naval officers; photographs of ships and men, illustrating life and training in the Navy.

(3) Department of the Navy, Bureau of Supplies and Accounts: Uniforms of petty officers and seamen of the United States Navy.

About one-half of the total number of exhibits secured were shipped in December, 1899, from New York and Baltimore by the U. S. transport *Prairie*, and were landed from that vessel at Havre, France,

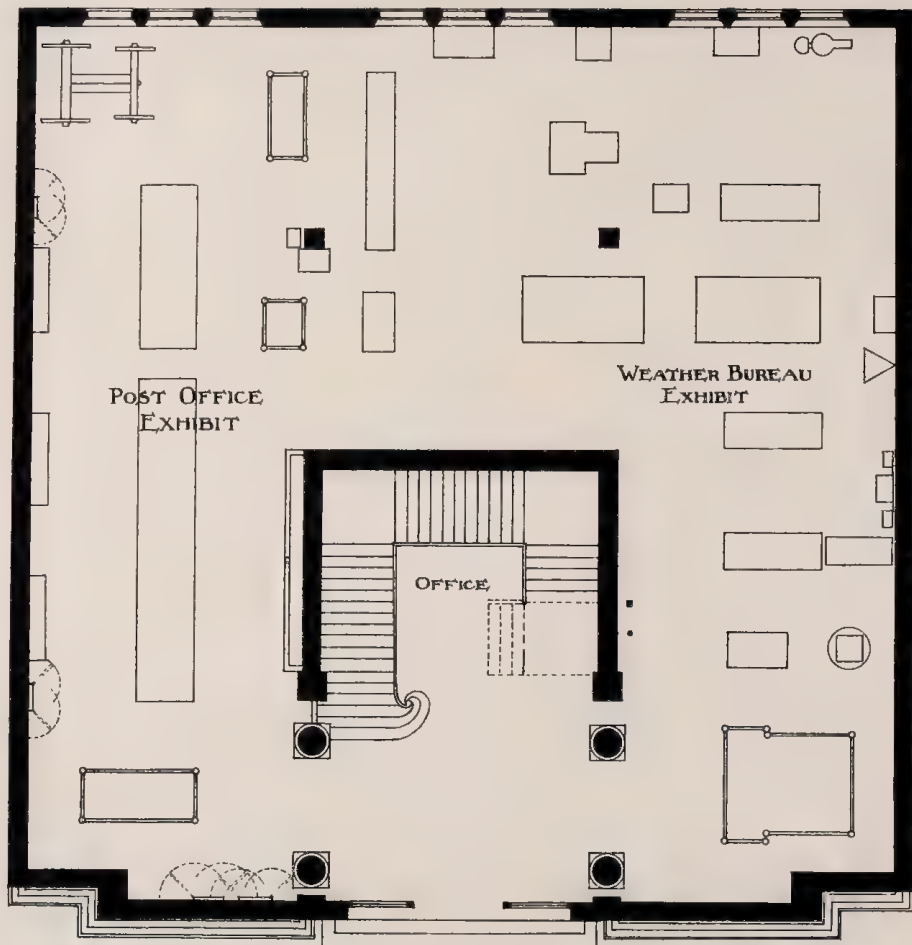
where they were warehoused. The remaining exhibits were, with few exceptions, collected at the Commission's warehouses in New York and Baltimore and were forwarded by the *Prairie* on the second trip, in February, 1900, and were landed at Rouen, France, under a shed close by the ship's berth at the dock.

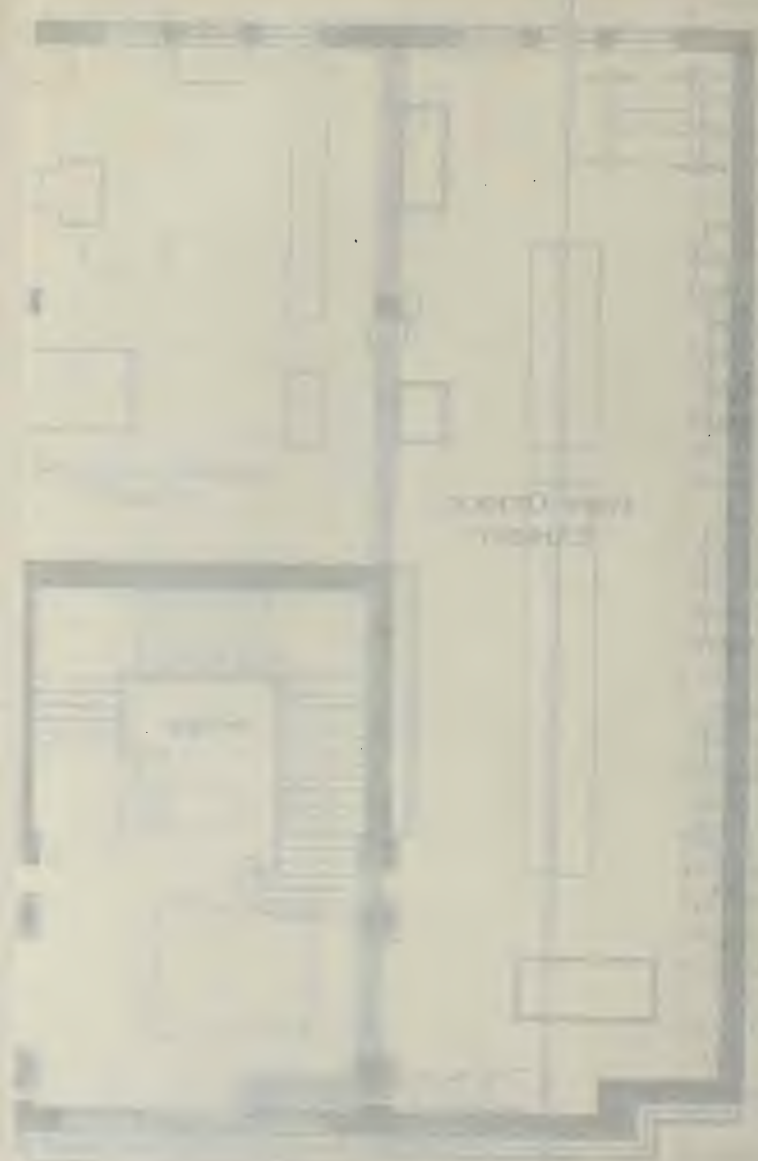
The model of the U. S. battle ship *Kearsarge*, being delayed in completion, was sent forward to Paris by express, as were also 15 cases of the exhibits of General Electric Company which had not been warehoused in New York early enough to be shipped by the *Prairie*. A few exhibits were also shipped by the exhibitors at their own expense.

In unloading the model of the *Olympia* at Rouen it was seriously damaged in handling, the glass case being broken and the model considerably wrecked in consequence. This accident led to an examination of all the models with the result that 11 were found to be injured. By the kind permission of the French ministry of marine, they were sent to the Cherbourg dockyard where they were thoroughly and efficiently repaired under the immediate personal direction of Naval Constructor H. G. Gillmor, United States Navy, especially detailed for this purpose by the Navy Department.

Owing to the fact that the palace of the Army and Navy was not completed at the date the Exposition was declared officially open, the United States space therein was not delineated or taken possession of until late in April, 1900, and further delay in preparing same for the receipt of the exhibits resulted from the failure of the contractor for floors and partitions to finish his work within a reasonable time. When the exhibits were finally sent forward from Havre and Rouen, the transportation facilities were so taxed that additional numerous and vexatious delays resulted. When the exhibits were finally received from Havre and Rouen, the slightly damaged models were overhauled on the space by workmen loaned from the Cherbourg dockyard, and the repaired models were sent forward from Cherbourg and the installation of all exhibits was made as promptly as possible; but, owing to all these causes, this section was not opened to the general public until June 14, 1900, at which time there was much unfinished installation, not only in the Army and Navy palace, but throughout the entire Exposition. From June 14, 1900, this section was maintained constantly ready for visitors during the daytime, the building being closed at night.

In making the installation there were employed (besides occasional laborers for unloading cars) 1 electrician, 2 expert seamen assistants, 3 helpers, 1 night watchman, and, for the time models were being overhauled, 3 model makers. During the Exposition United States section in Group XVIII had for its service and management 1 electrician, 2 expert assistants, who also acted as guards and janitors, and 1 night watchman.





THE FOLLOWING ARE THE ROOMS IN THE BUILDING:
 SOUTH SIDE WITH EAST-HINGED DOOR
 NORTH SIDE WITH WEST-HINGED DOOR

In the display of marine electrical apparatus and accessories in this section, and for working the electric safety water-tight door, electric power was obtained from and through the courtesy of the Compagnia des Chemins de fer de l'Ouest.

United States awards, etc., Group XVIII.—Class 116, 1 entry, no award; class 117, 1 entry, 1 award; class 118, 21 entries, 2 awards and 14 collaborator awards; class 119, 11 entries, 10 awards and 2 collaborator awards, same persons holding awards; class 120, 3 entries, 2 awards; class 121, no entries. There was no United States juror for this group or for any one of the classes in the group.

Number of packages received by *Prairie*, 166; number received by express, 27; weight of packages received by *Prairie*, 29,728 kilos; weight of packages received by express, 10,520 kilos.

For repacking the exhibits in this section there was employed (besides the administrative staff of 1 electrician, 2 expert seamen, and 1 night watchman) 1 carpenter, 1 carpenter's helper, 2 painters (for about fifteen days each), 4 helpers for handling and packing, and 1 customs interpreter.

All material, except what was expended or abandoned as of no further utility, was returned to the United States by the U. S. transport *Prairie* and sent on to destination.

The services of Lieut. H. C. Poundstone, United States Navy, showed the results of his careful naval training and were very satisfactory. The limited space was ingeniously utilized to the best advantage and all articles could be readily examined. The entire exhibit was kept in perfect order and condition.

Respectfully submitted.

WILLARD A. SMITH,
Director of Army and Navy.

COMPLETE LIST OF EXHIBITS IN UNITED STATES MILITARY AND NAVAL SECTION AT
THE PARIS EXPOSITION OF 1900.

1. Model of U. S. gunboat *Annapolis* and class.
2. Model of U. S. gunboat *Bancroft*.
3. Model of U. S. double-turreted monitor *Miantonomoh*.
4. Model of U. S. gunboat *Yorktown* and class.
5. Model of U. S. gunboat *Petrel*.
6. Model of U. S. second-class battle ship *Maine*.
7. Model of U. S. double-turreted monitor *Monterey*.
8. Model of U. S. protected cruiser *Baltimore*.
9. Model of U. S. dynamite gunboat *Vesuvius*.
10. Model of U. S. corvette *Kearsarge*.
11. Model of U. S. protected cruiser *Newark*.
12. Model of U. S. armored cruiser *New York*.
13. Model of U. S. second-class battle ship *Texas*.
14. Model of U. S. gunboat *Helena* and class.

15. Model of U. S. armored ram *Katahdin*.
16. Model of U. S. first-class battle ship *Oregon* and class.
17. Model of U. S. protected cruiser *Charleston*.
18. Model of U. S. protected cruiser *Columbia* and class.
19. Model of U. S. gunboat *Nashville*.
20. Model of U. S. protected cruiser *Atlanta* and class.
21. Model of U. S. first-class battle ship *Illinois* and class.
22. Model of U. S. gunboat *Wheeling* and class.
23. Model of U. S. first-class battle ship *Iowa*.
24. Model of U. S. protected cruiser *Olympia*.
25. Model of U. S. first-class battle ship *Kearsarge* and class.
26. Model of U. S. side-wheel steamer *Powhatan*.
27. Model of U. S. auxiliary steam frigate *Colorado*.
28. Model of U. S. double-turreted monitor *Amphitrite*, 1862.
29. Model of original river and harbor monitors.
30. Model of Holland submarine torpedo boat, type 7.
31. Half model of old-line battle ship *Ohio*.
32. Half model of old "razee" frigate *Independence*.
33. Model of midship section of latest type of first-class battle ship.
34. Model of stem of latest type of first-class battle ship.
35. Model of stern of latest type of first-class battle ship.
36. Model of midship section of gunboat with side-bar keel.
37. Model of midship section of composite vessel of *Annapolis* class.
38. Model of U. S. S. *Antietam* on the stocks, showing wooden ship construction.
39. Model of Hichborn turret.
40. Full-size model of the Franklin life buoy, designed by Chief Constructor Philip Hichborn, United States Navy.
41. Full-size model of an electrically operated water-tight door, designed by Naval Constructor F. T. Bowles, United States Navy.
42. Model of old hand capstan.
43. Model of new steam capstan. American Ship Windlass Company, Providence, R. I., U. S. A.
45. Model of old hand steering wheel.
46. Model of new steam steering gear. Williamson Brothers Company, Philadelphia, Pa., U. S. A.
47. Photographs showing docks, shops, and plant at the navy-yard, New York, U. S. A.
48. Photograph of U. S. first-class battle ship *Indiana*.
49. Photograph of U. S. first-class battle ship *Massachusetts*.
50. Photograph of U. S. armored cruiser *Brooklyn*.
51. Photograph of U. S. armored cruiser *New York*.
52. Photograph of U. S. armored ram *Katahdin*.
53. Photograph of U. S. double-turreted monitor *Miantonomoh*.
54. Photograph of U. S. double-turreted monitor *Puritan*.
55. Photograph of U. S. double-turreted monitor *Terror*.
56. Photograph of U. S. protected cruiser *Atlanta*.
57. Photograph of U. S. protected cruiser *Baltimore*.
58. Photograph of U. S. protected cruiser *Boston*.
59. Photograph of U. S. protected cruiser *Charleston*.
60. Photograph of U. S. protected cruiser *Chicago*, with sail power.
61. Photograph of U. S. protected cruiser *Cincinnati*.
62. Photograph of U. S. protected cruiser *Columbia*.
63. Photograph of U. S. protected cruiser *Minneapolis*.
64. Photograph of U. S. protected cruiser *Newark*.

65. Photograph of U. S. protected cruiser *Olympia*.
66. Photograph of U. S. protected cruiser *Philadelphia*.
67. Photograph of U. S. protected cruiser *Raleigh*.
68. Photograph of U. S. protected cruiser *San Francisco*.
69. Photograph of U. S. unprotected cruiser *Montgomery*.
70. Photograph of U. S. gunboat *Bancroft*.
71. Photograph of U. S. gunboat *Bennington*.
72. Photograph of U. S. gunboat *Yorktown*.
73. Photograph of U. S. gunboat *Wilmington*.
74. Photograph of U. S. dispatch boat *Dolphin*.
75. Photograph of U. S. dynamite gunboat *Vesuvius*.
76. Photograph of U. S. torpedo boat *Ericsson*.
77. Photograph of U. S. second-class battle ship *Maine*.
78. Photograph of U. S. first-class battle ship *Kearsarge*.
79. Photograph of U. S. protected cruiser *Chicago* without sail power.
80. Photograph of armored cruiser *Brooklyn*, from Brooklyn Bridge.
81. Photograph of U. S. first-class battle ship *Iowa*.
82. Photograph of U. S. training ship *St. Marys*.
83. Frame containing photographs of ships and men illustrative of life and training in the United States Navy.
84. Frame containing medals voted by Congress to United States naval officers.
85. The seal of the Navy Department, carved in wood.
86. United States Navy standard compensating binnacle, Type IV.
87. United States Navy conning-tower binnacle, Negus.
88. United States torpedo-boat compensating binnacle, Negus.
89. Seven and one-half inch United States Navy standard compass, Ritchie.
90. Seven-inch curved card compass, Ritchie.
91. Twelve-inch flat card compass, Ritchie.
92. Ten-inch flat card compass, Ritchie.
93. Nine-inch flat card compass, Ritchie.
94. Eight-inch flat card compass, Ritchie.
95. Seven-inch flat card compass, Ritchie.
96. Six-inch flat card compass, Ritchie.
97. Five-inch flat card compass, Ritchie.
98. Seven-inch transparent card compass, patented, Ritchie.
99. Four-inch United States Navy boat compass, Ritchie.
100. United States Navy standard azimuth circle, Ritchie.
101. Bar azimuth circle, Ritchie.
102. Pelorus, United States Navy standard, Ritchie.
103. Horizontal and vertical force instruments, Ritchie.
104. Marine chronometer, No. 1366, Negus; used on *Polaris* expedition.
105. Marine chronometer, No. 1630, Negus; used on *Jeannette* expedition.
106. Sextant, high grade, No. 37, Warner & Swasey.
107. Sextant, hydrographic, No. 1794, Brandis's Sons.
108. Octant, day, Queen.
109. Octant, night, Blunt.
110. Deck clock.
111. Yacht clock.
112. Boat clock.
113. Three-arm protractor.
114. Telemeter, Lowry.
115. Set of drawing instruments.
116. Captain's reading glass.
117. Artificial horizon.

118. Navigator's dividers.
119. Steel tapeline.
120. Thermometer; air and water.
121. Thermometer; maximum and minimum.
122. Comparing watch.
123. Parallel rulers, Sigsbee.
124. Stadimeter, Fiske.
125. Patent log, taffrail, complete.
126. Book illustrating flags of maritime nations.
127. International Code Signal book.
128. Set of flags of maritime nations.
129. Set of international signal flags.
130. Set of United States ensigns, standard sizes.
131. Battle-ship ensign, United States Navy.
132. Set of Union Jacks, United States.
133. Distinctive flags and pennants, United States Navy.
134. President's flag.
135. Flag of the Secretary of the Navy.
136. Flag of the Assistant Secretary of the Navy.
137. Admiral's flag, United States Navy.
138. Vice-Admiral's flag, United States Navy.
139. Rear-admiral's flag, blue, United States Navy.
140. Rear-admiral's flag, red, United States Navy.
141. Rear-admiral's flag, white, United States Navy.
142. Narrow pennants, United States Navy.
143. Senior officer's mark, United States Navy.
144. Squadron distinguishing flags, United States Navy.
145. Divisional pennants, United States Navy.
146. Annulling flag, United States Navy.
147. Compass flag, United States Navy.
148. Convoy flag, United States Navy.
149. Danger flag, United States Navy.
150. Dispatch flag, United States Navy.
151. Infantry flag and guidon, United States Navy.
152. Artillery flag and guidon, United States Navy.
153. Naval reserve and guidon, United States Navy.
154. General recall, United States Navy.
155. Geneva cross.
156. Powder flag, United States Navy.
157. Position pennant, United States Navy.
158. Quarantine flag, United States Navy.
159. Telegraph flag, United States Navy.
160. Cornet, United States Navy.
161. Guard flag, United States Navy.
162. Church pennant, United States Navy.
163. Answering pennant, United States Navy.
164. Interrogatory pennant, United States Navy.
165. Preparatory pennant, United States Navy.
166. Numeral pennant, United States Navy.
167. Affirmative pennant, United States Navy.
168. Negative pennant, United States Navy.
169. Signal kit, United States Navy.
170. Samples of rope, United States Navy, manufactured at United States Government rope walk, Boston, Mass., U. S. A.

171. Set of sailing directions, United States Navy.
172. Report of hydrographer, United States Navy.
173. Miscellaneous publications relating to hydrography, meteorology, magnetism, and navigation.
174. Portfolio of pilot charts of North Atlantic Ocean.
175. Portfolio of pilot charts of North Pacific Ocean.
176. Portfolio of characteristic charts, Hydrographic Office, United States Navy.
177. Set of gnomonic charts, Hydrographic Office, United States Navy.
178. Hydrographic Office chart No. 1290, framed.
179. Pilot chart of North Atlantic Ocean, framed.
180. Pilot chart of North Pacific Ocean, framed.
181. Magnetic variation and dip for year 1900, chart No. 1700, framed.
182. Horizontal intensity of earth's magnetic force for year 1900, chart No. 1701, framed.
183. Submarine-cable connections of the world, chart No. 1530, framed.
184. Cable connections on an enlarged scale, chart No. 1781, framed.
185. Coaling, docking, and repairing stations, chart No. 1530A, framed.
186. Pilot chart of the Great Lakes, chart No. 1675, framed.
187. Average time of closing of navigation on the Great Lakes, chart No. 1684, framed.
188. Average times of opening navigation on the Great Lakes, chart No. 1695, framed.
189. Cerros Island to Abreojos Point, chart No. 1310, framed; representative of drafting and engraving from surveys made by officers of the United States Navy.
190. Ocos River to San Juan del Sur, chart No. 931, framed; representative of drafting and engraving from surveys made by officers of the United States Navy.
191. Amakirma Group, with part of Loo Choo, chart No. 67, framed; specimen of chart execution.
192. Guadalupe and adjacent islands, chart No. 363, framed; specimen of chart execution.
193. Cloud forms, chart No. 1600, framed.
194. Chart showing drift of "bottle papers," framed, with samples of papers from actual drifts.
195. Model or relief map of the West Indies and Caribbean Sea.
196. Navigation instruments, United States Navy. Navigation instruments, United States Navy ("Tanner-Blish" navigational sounding apparatus).
197. Chart construction, Hydrographic Office, United States Navy.
198. Records of angles taken in the survey of west coast of Lower California.
199. Records of soundings taken in the survey of west coast of Lower California.
200. Records of tides on west coast of Lower California.
201. Methods and results of the survey of west coast of Lower California.
202. Plotting sheet of U. S. S. *Ranger's* survey of west coast of Lower California from Cerros Island to Abreojos Point.
203. Drawing of U. S. S. *Ranger's* survey of west coast of Lower California from Cerros Island to Abreojos Point.
204. Gelatin tracing of the drawing of U. S. S. *Ranger's* survey of west coast of Lower California from Cerros Island to Abreojos Point.
205. Original engraving on copper of United States Hydrographic Office chart No. 1310, entitled "The west coast of Lower California from Cerros Island to Abreojos Point."
206. Electrotpe "Alto" of the original engraving of United States Hydrographic Office chart No. 1310, entitled "The west coast of Lower California from Cerros Island to Abreojos Point."
207. United States Hydrographic Office chart No. 1310, entitled "The west coast

of Lower California from Cerros Island to Abreojos Point," printed from original engraving.

208. Forty volumes of Washington Astronomical and Meteorological Observations, 1845 to 1892, inclusive, from United States Naval Observatory.

209. Miscellaneous publications of United States Naval Observatory.

210. Description of United States Government system of observatory time.

211. Standard time map.

212. Plan of connections for sending out United States Naval Observatory time.

213. Method of testing chronometers at United States Naval Observatory.

214. United States Naval Observatory buildings.

215. Twenty-six-inch equatorial telescope, general view.

216. Six-inch transit circle room.

217. Six-inch west transit circle room.

218. Six-inch west transit circle.

219. Alt-azimuth instrument.

220. Twelve-inch equatorial.

221. Great equatorial building, transit circle building, and clock room.

222. Prime vertical transit, level off.

223. Prime vertical transit, level on.

224. Twenty-six-inch equatorial, central part of tube and mounting.

225. Partial view of time-service room.

226. Twenty-six-inch equatorial, with spectroscope attached.

227. Twenty-six-inch equatorial mounting and lower part of telescope.

228. Twenty-six-inch equatorial, with micrometer attached.

229. Equatorial mounting, 12-inch telescope.

230. Library, main building, United States Naval Observatory.

231. General view of United States Naval Observatory.

232. Main building, United States Naval Observatory.

233. Twenty-six-inch equatorial building, United States Naval Observatory.

234. South transit instrument, used in connection with United States Naval Observatory time.

235. Photograph of buildings and instruments of United States Naval Observatory.

236. Forty-eight volumes of the American Ephemeris and Nautical Almanac, 1855 to 1902, inclusive, from Nautical Almanac Office, United States Navy.

237. Life-saving and signal rockets and signal lights, exhibit of Pain's Fireworks Company, New York.

238. A 32-kilowatt marine generating set, General Electric Company, Schenectady, N. Y.

240. United States Navy standard wiring appliances, General Electric Company, Schenectady, N. Y.

241. United States Navy standard night-signal set, General Electric Company, Schenectady, N. Y.

242. United States standard incandescent lamps, 10 to 50 candlepower, General Electric Company, Schenectady, N. Y.

243. United States Navy standard ventilating set, General Electric Company, Schenectady, N. Y.

244. United States Navy 30-inch electric-control searchlight projector, General Electric Company, Schenectady, N. Y.

245. Lidgerwood electrically operated winch, with motor and controller, Lidgerwood Manufacturing Company, New York, and General Electric Company, Schenectady, N. Y.

246. Inclosed motor for ammunition hoisting, rammer and elevating, General Electric Company, Schenectady, N. Y.

247. Inclosed ordnance motor, with solenoid brakes, for hoisting fixed ammunition, General Electric Company, Schenectady, N. Y.
248. Photographs of electrical apparatus manufactured for United States Navy and United States Army by the General Electric Company, Schenectady, N. Y.
249. United States Navy standard electrical fixtures, manufactured by Page Bros. & Co., Boston, Mass.
250. Portable motor, Type A.
251. Portable motor, Type B.
252. Portable motor, No. 5.
253. Bulkhead fixture.
254. Battle lantern.
255. Deck lantern.
256. Ceiling fixture, No. 1, silver plated.
257. Ceiling fixture, No. 2, silver plated.
258. Ceiling fixture, No. 3, silver plated.
259. Bunker fixture.
260. Desk light, silver plated.
261. One-light bracket.
262. Four-light cargo fixture.
263. Magazine lantern.
264. Diving lamp.
265. Steam-tight globe, guarded.
266. Truck light.
267. Conduit fixture, Type B.
268. Conduit fixture, Type G.
269. Side lights.
270. Masthead light.
271. Anchor light.
272. Signal light, white.
273. Photograph of gun and gun-carriage shops at United States Naval Gun Factory, Washington, D. C.
274. Photograph of United States Naval Gun Factory, Washington, D. C.
275. Photograph of service arms, United States Navy and United States Marine Corps.
276. Miniature steel models of types of United States naval guns, calibers 4-inch, 6-inch, 8-inch, 10-inch, 12-inch, and 13-inch.
277. Photograph of works of the Bethlehem Steel Company, South Bethlehem, Pa.
278. Photographs illustrating the manufacture of armor plate, ordnance, and hollow or solid forged shaftings, and general forgings and castings by the Bethlehem Steel Company.
279. Iron-ore mines, island of Cuba: (a) Mining village; (b) mine opening; (c) loading ore; (d) shipping ore.
280. Blast furnaces: (a) Storage plant; (b) furnaces; (c) filling furnace; (d) casting pig iron.
281. Open-hearth furnaces: (a) Stock yard; (b) furnaces; (c) charging furnace; (d) casting steel ingot.
282. Steel ingots: (a) Fluid-compression plant; (b) fluid-compressed ingot; (c) ingot for 16-inch 120-ton gun; (d) armor-plate ingot.
283. Armor plate: (a) Heating ingot; (b) forging armor; (c) bending armor; (d) machining armor.
284. Armor plate: (a) Armor-plate machine shop; (b) armor-plate machine shop; (c) turrets for 13-inch guns of U. S. S. *Indiana*; (d) conning tower and entrance shield of U. S. S. *Massachusetts*.

285. Armor plate—ballistic tests: (a) July, 1892, 10½-inch Harvey nickel-steel plate, tested with 8-inch gun; (b) December, 1895, 14½ to 8 inch taper harveyed nickel-steel plate for Russian battle ship *Sevastopol*; (c) May, 1897, 10-inch harveyed nickel-steel plate, tested with 8-inch gun; (d) May, 1898, 6-inch improved face-hardened plate, tested with 8-inch gun.

286. Ordnance: (a) Cutting fluid-compressed ingot; (b) boring fluid-compressed ingot; (c) heating fluid-compressed ingot; (d) hollow forging, 12-inch tube gun.

287. Ordnance: (a) Oil tempering 12-inch gun tube; (b) gun-finishing machine shop; (c) United States Army 12-inch gun; (d) shipment of United States Army 8-inch and 10-inch guns.

288. Ordnance: (a) 12-inch disappearing gun carriage, loading position; (b) 12-inch disappearing gun carriage, firing position; (c) United States Navy 4-inch rapid-fire gun and mount; (d) United States Army 12-inch mortars.

289. Forgings: (a) Nickel-steel field ring for dynamo; (b) four-throw crank shaft for United States torpedo-boat destroyer; (c) hollow-forged shaft for stationary engine; (d) built-up crank and thrust shafts for marine engines.

290. Special view: (a) 14,000-ton hydraulic forging press; (b) 15,000-horsepower pumping engine; (c) general machine shop, 1,375 feet long and 118 feet wide; (d) 125-ton steam hammer.

291. Photograph of shops of the E. W. Bliss Company, Brooklyn, N. Y., showing manufacture of Whitehead torpedoes.

292. United States torpedo boat *Stiletto* discharging Howell torpedo of explosion.

293. Photograph of United States Navy service spar torpedo.

294. Photograph of destruction of a "boom" by two service spar torpedoes.

295. Photograph of destruction of an old mainmast by two exercise torpedoes.

296. Patrick dirigible torpedo at 20 knots speed.

297. Standard sizes of the cartridge cases used in the United States Navy.

298. Cutlasses, United States Navy pattern.

299. Sword bayonets, United States Navy pattern.

300. Drawings and photographs of the buildings and grounds of the United States Naval Academy, Annapolis, Md. Prepared and loaned by Ernest Flagg, architect, New York.

301. Photographs illustrating characteristic phases of cadet life and training at United States Naval Academy, Annapolis, Md.

302. Physical drill.

303. Cadet quarters.

304. Mess formation.

305. Mess hall.

306. Cadet's room.

307. Recitation room.

308. Practice ship.

309. Cadets at surveying work.

310. Full-rigged model of *Antietam*, used for instruction in seamanship.

311. Seamanship model room.

312. Cadet armory.

313. Workroom of cadet armory.

314. Cadets at machine work.

315. Cadets at work aloft.

316. Boat drill under oars.

317. Boat drill under sail.

318. Setting-up exercises.

319. Dress parade.

320. Infantry drill.

321. Wall scaling.

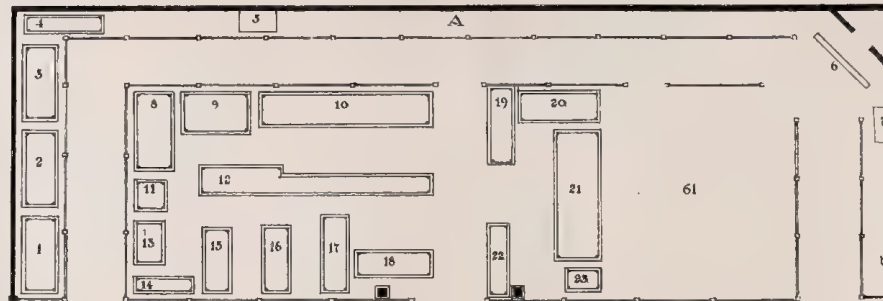
322. Artillery drill.
323. Cadet boat's crew.
324. Cadets at football.
325. Cadets at gymnastic exercise.
326. Group of cadets in characteristic uniforms.
327. Seventeen volumes general-information series, Office of Naval Intelligence.
328. Coaling, docking, and repair facilities of the world, Office of Naval Intelligence.
329. War notes, I to VI, Office of Naval Intelligence.
330. War series, I to IV, Office of Naval Intelligence.
331. Report of Chief of Bureau of Navigation, Navy Department, for 1898.
332. Appendix to report of Chief of Bureau of Navigation, Navy Department, for 1898.
333. Engines of United States armored cruiser *New York*.
334. Engines of side-wheel steamer *Powhatan* and torpedo boat *Ericsson*, of the same indicated horsepower, showing advance in engine design.
335. Engines of U. S. S. *Marblehead*.
336. Engines of U. S. S. *Concord*.
337. Blue prints of details of engines of United States armored cruiser *New York* and U. S. S. *Detroit*.
338. Water-tube boilers (Babcock & Wilcox design) of the United States protected cruisers *Chicago* and *Atlanta*; loaned by the Babcock & Wilcox Company, New York.
339. U. S. S. *Chicago's* water-tube boilers and connections (white print); loaned by Babcock & Wilcox Company, New York.
340. Sample of forged-steel header used in the construction of Babcock & Wilcox water-tube boilers, showing hand-hole plate brace and jacket, and same tubes expanded into place; loaned by the Babcock & Wilcox Company, New York.
341. Model of Melville water-tight door; designed by Engineer in Chief George W. Melville, United States Navy.
342. Model of the beam engine of a Pacific mail steamer.
343. Model of a Blake vertical twin air pump, loaned by the George F. Blake Manufacturing Company, New York.
344. Model of a jib dock crane, loaned by William Sellers & Co., Philadelphia, Pa.
345. Uniforms of petty officers and seamen, United States Navy.
346. Uniforms, arms, and accouterments of United States Marine Corps.
347. History of the Twelfth New Hampshire Volunteers, 1862 to 1865, by Capt. A. W. Bartlett.
348. Miscellaneous publications of the Navy Department.
349. Set of international signals, Signal Corps, United States Army.
350. Set of field signal flags and staffs, Signal Corps, United States Army.
351. Practice signal kits, Signal Corps, United States Army.
352. Heliographs, complete, Signal Corps, United States Army.
353. Field telegraph kit, Type D, Signal Corps, United States Army.
354. Field telegraph kit, Type E, Signal Corps, United States Army.
355. Field telescope and tripod, Signal Corps, United States Army.
356. Signal lanterns, Signal Corps, United States Army.
357. Porro-prism field glass, Warner & Swasey, Signal Corps, United States Army.
358. Hand reel with breastplate, Signal Corps, United States Army.
359. Photographs of actual field operations in the Philippines during the insurrection, taken by officers and men of the Signal Corps, United States Army.
360. Series of photographs of Allen dense-air ice machine, exhibited by H. B. Roelker, mechanical engineer, 41 Maiden lane, New York.
361. Photograph of gas plant installed at United States Naval Gun Factory (added since Exposition opened); (a) Isham dynamite shell and accessories; (b) Scripture's electrical color-sense tester.

ARMY AND NAVY.

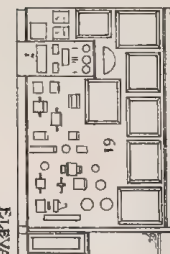
1. Uniforms, cases.
2. Uniforms, cases.
3. Uniforms, cases.
4. Cannon models.
5. Table with signal flags.
6. Electric bulkhead door.
7. Switch board.
8. Uniforms.
9. Steering gear, Williamson Brothers Company.
10. "Antietam," a model.
11. American Ship Windlass Company.
12. Models of construction.
13. Model of a turret.
14. *Holland* (model).
15. *Bancroft* (model).
16. *Wheeling* (model).
17. *Nashville* (model).
18. *Helena* (model).
19. *Vesuvius* (model).
20. *Annapolis* (model).
21. *Powhatan* (model).
22. *Katahdin* (model).
23. Car crane, Sellers & Co.
24. Fire-alarm box.
25. *Maine* (model).
26. *Yorktown* (model).
27. *Newark* (model).
28. *Charleston* (model).
29. *Baltimore* (model).
30. Franklin life buoy.
31. *Petrel* (model).
32. Case of photographs, United States Navy.
33. Ship signals, by Paine Manufacturing Company.
34. *Monterey* (model).
35. *Miantonomoh* (model).
36. *Atlanta* (model).
37. *Texas* (model).
38. Sample case of rope, Boston Navy-Yard.
39. *Oregon* (model).
40. *Kearsarge* (model).
41. *Cornet Kearsarge* (model).
42. *Illinois* (model).
43. *Olympia* (model).
44. *Iowa* (model).
45. *New York* (model).
46. *Columbia* (model).
47. Case of navigation instruments.
48. Navy compasses.
49. Engines (models).
50. Case of navigation charts.
51. A binnacle.
52. A binnacle.
53. Table.



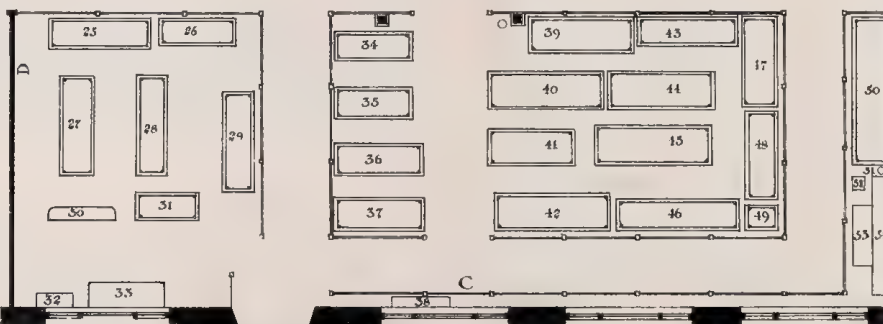
ELEVATION OF WALL A



MAIN AISLE OF PALACE



ELEVATION OF WALL B



ELEVATION OF WALL C



PARIS EXPOSITION OF 1900.
PLAN OF INSTALLATION IN UNITED STATES SPACE
PALACE OF ARMY AND NAVY.
GROUP XVIII

54. Bookcase of Army and Navy publications, with model of ship above.
55. Photographs of Naval Gun Factory.
56. Cartridges.
57. Photographs of gun factory.
58. Photographs from the United States Naval Academy.
59. Plans for new building at United States Naval Academy.
60. Photographs of battle ships.
61. Exhibit of General Electric Company, Schenectady, N. Y.
62. Photographs of observatories, telescopes, etc.
63. Photographs of telescopes.
64. Navigation charts.
65. Model of an old vessel.
66. Photographs of United States naval engines.
67. Photographs of United States Navy.
68. Photographs of United States Navy machinery.
69. Seal of the United States Navy Department.
70. A model of "Washington and Independence."
71. Views of New York Navy-Yard.
72. Views of New York Navy-Yard.
73. A model of the *Ohio*.
74. Views of New York Navy-Yard.
75. Views of New York Navy-Yard.
76. Ship signals, by Paine Manufacturing Company.
77. Photographs of engines of U. S. S. *Concord*.
78. Bethlehem Steel Company's exhibit.
79. Miscellaneous photographs of United States Navy and Army.

With this survey of exhibits of Groups VI and XVIII and of the interests represented, I conclude my report with thanks to the Commissioner-General and the director in chief of exhibit departments for their uniform courtesy, consideration, and appreciation, and to the members of the staff of the department for their fidelity to the trusts imposed upon them.

Respectfully submitted.

WILLARD A. SMITH,

Director of Civil Engineering and Transportation.

Hon. FERDINAND W. PECK,

Commissioner-General to the Paris Exposition of 1900.

REPORT OF THE DEPARTMENT OF AGRICULTURE.

GROUPS VII, VIII, AND X.

CHARLES RICHARDS DODGE, DIRECTOR.

DEPARTMENT OF AGRICULTURE.

(GROUPS VII, VIII, AND X.)

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Key to illustrations and views.—Classification.—Keys to installation.—Letter of transmittal.—Introduction.—Preliminary work.—Arrangement by sections of the exhibits of this department.—Exploitation.—Allotment of space.—Assembling and preparation of exhibit material.—Cost to commercial exhibitors under collective scheme.—The work of installation.—Exhibits in palace of agriculture, Groups VII and X: The fish-food court; the meat and dairy exhibits; bee keeping and entomology; report of Dr. L. O. Howard; grains and cereals; cereal-food court; the maize kitchen; miscellaneous vegetable products; the wine and liquor court; sugar and confectionery court; the fertilizer court; the forage and food of animals court; leaf-tobacco court; the fiber court; list of collective exhibitors of cotton samples; food mills, etc.; the experiment station exhibit; retrospective exhibit of harvesting machinery.—Exhibits in the agricultural annex.—Weather Bureau exhibit (marine annex).—Exhibits at Vincennes.—Horticulture and arboriculture (Group VIII).—List of employees and dates of service.—Catalogue, Groups VII, VIII, and X.

KEY TO ILLUSTRATIONS AND VIEWS.

- F-1. Bird's-eye view of façade from gallery, looking west.
- F-2. Main portal of façade and main transverse aisle, looking northwest.
- F-3. Section of façade, showing arrangement of pier cases in the arches.
- F-4. General view of space, with near view of dairy court and bee-keeping exhibits, from the entresol gallery, looking east.
- F-5. General view of space, looking south from entresol gallery.
- F-6. General view of space in rear of main transverse aisle, showing in foreground the farm machinery retrospective exhibit, looking north.
- F-7. The collective exhibit of leaf tobacco.
- F-8. Meat and grain court, showing model of packing house, etc., looking northeast from the main transverse aisle.
- F-9. General view of fish-food court, looking west.
- F-10. View of meat court, showing mammoth refrigerator and packing-house exhibits on either side, from main transverse aisle looking west.
- F-11. View of wine and liquor court, looking east.
- F-12. Near view of dairy court, looking northeast.
- F-13. View of cereal-food court, looking northwest through arch of façade.
- F-14. Near view of milling exhibits, cereal-food court, showing style of alcove and pavilion cases employed throughout the space.
- F-15. View of agricultural annex, looking south.

F-16. View on ground floor of agricultural annex, looking northwest, central section.

F-17. View on ground floor of agricultural annex. End section northwest.

F-18. View on second floor agricultural annex, looking north from main stairway.

F-19. View on second floor agricultural annex, central section, looking south.

F-20. View on third floor agricultural annex, with corn kitchen at extreme end, looking southeast.

F-21. United States Weather Bureau exhibit, marine annex, view of principal recording-instrument exhibits, showing about one-third of floor space occupied.

F-22. General view of horticultural exhibit in United States horticultural annex, Group VIII, west from main palace of horticulture.

F-23. General view of horticultural space, United States annex, looking north.

F-24. View of horticultural-implement section, Group VIII, looking west.

F-25. View of horticultural-implement section, Group VIII, looking east.

F-26. Pavilion of the McCormick Harvesting Machine Company at Vincennes.

F-27. Panoramic farm and factory scene, by Deering Harvester Company.

CLASSIFICATION.

GROUP VII.—AGRICULTURE.

CLASS 35.—*Farm equipment and the methods of improving land.*

Specimens of various systems of farming. Plans and models of farm buildings; general arrangement; stables, sheep folds, barns, pigstyes, breeding grounds; special arrangements for breeding and fattening cattle. Furniture for stables, barns, kennels, etc. Harness. Shoeing. Equipment and methods of veterinary surgery science. Materials and appliances used in agricultural engineering; reclaiming of marshes; drainage, irrigation. Tools, implements, machines, and appliances used in the preparation of the soil, in sowing, planting, cleaning land (of weeds, etc.), harvesting and the preparation and preservation of crops and of animal products. Agricultural machinery moved by animals, wind, water, steam, or electricity. Portable agricultural machines and horsepowers. Windmills. Pumps. Weighing machines. Equipment for cartage and transportation. Granaries. Silos. Retting pits. Apparatus for preparing food for animals. Preparation and preservation of manures. Fertilizers. Commercial fertilizers. Use of sewage.

CLASS 36.—*Appliances and methods of viticulture.*

Types of buildings used in connection with viticulture. Implements used in the culture of the vine; implements for deep ploughing; vine plows; hoes; tools for grafting, pruning, gathering, etc. Collection of vines. Appliances of vintages, wine sheds, and cellars. Vehicles; grape pickers; wine presses, etc. Methods of wine making. Methods, appliances, and materials for preserving wines. Ferments. Diseases of wines and methods of checking them.

CLASS 37.—*Appliances and methods used in agricultural industries.*

Types of agricultural factories connected with farming; dairies; creameries; cheese factories; distilleries, starch factories, etc. Oil mills. Margarine factories. Workshops for the preparation of textile fibers. Equipments for the breeding of birds and for the artificial hatching and fattening of poultry.

CLASS 38.—*Theory of agriculture—Agricultural statistics.*

Studies relating to soil and water from an agricultural point of view. Agrologic charts, agronomic charts, climatic charts, various agricultural charts. Registers of land tenures. Rural population. Division of cultivated territory. Yield and

returns. Census of farm animals. Progress, especially since 1889. History of agriculture in its successive changes. History of fluctuations in prices of land, rents, labor, live stock, crops, and animal products. Institutions for the promotion and advancement of agriculture. Agricultural experiment stations and laboratories, plans, models, organization, staff, implements, expense, work. Societies, agricultural communions, and associations. Loans on lands. Loans on agricultural security. Benevolent institutions. Agricultural insurance. Legislative and administrative measures. Books, papers, statistics, diagrams, periodical publications.

CLASS 39.—*Vegetable food products.*

Cereals—Wheat, rye, barley, rice, maize, millet, and other cereals in sheaves or in grain. Legumes—Broad beans, beans, pease, lentils, etc. Tubers and roots—Potatoes, beets, carrots, turnips, etc. Sugar-producing plants—Beets, cane, sorghum, etc. Miscellaneous plants—Coffee, cocoa, etc. Oil-producing plants—Olives, edible vegetable oils. Forage, cured or in silos, and fodder for cattle.

CLASS 40.—*Animal food products.*

Edible animal fats and oils. Milk, fresh or preserved. Butter, fresh, salted, or partly salted. Cheese. Eggs.

CLASS 41.—*Inedible agricultural products.*

Textile plants—Cotton, flax and hemp in the straw, scutched or unscutched; ramie, phormium tenax, textile vegetable fibers of all kinds. Oil-producing plants, in stalk or in seed. Nonedible fats and oils. Plants containing tannin. Plants containing dyes; medicinal plants. Tobacco, in stalk, in leaf, and in seed.¹ Hops; teasels, etc. Plants and seeds from natural or cultivated prairies. Wool, raw, washed or unwashed. Hair and bristles of domestic animals. Feathers, down, hair, etc.

CLASS 42.—*Useful insects and their products—Injurious insects and plant diseases.*

Systematic collections of useful and injurious insects. Bees; silkworms and other bombycids; cochineal insects. Systematic collections of vegetable parasites of plants and animals. Appliances for rearing and keeping bees and silkworms; their products; honey, wax, cocoons. Appliances and processes for destroying plant diseases and injurious insects.

GROUP VIII.—HORTICULTURE AND ARBORICULTURE.

CLASS 43.—*Appliances and methods of horticulture and arboriculture.*

Tools for gardeners and nurserymen—Spades, picks, hoes, lawn mowers, garden rollers. Tools for pruning, grafting, gathering, packing, and transporting produce; pruning and grafting knives, ladders, props, watering apparatus. Apparatus and objects for ornamenting gardens—Vases, pots, chairs, seats, fountains, labels, etc. Glass houses and their accessories—Heating apparatus; mattings, etc. Ferneries, etc., for use in dwellings. Aquariums for aquatic plants. Garden architecture—Plans, drawings, models, books, pictures, etc.

CLASS 44.—*Vegetables.*

Vegetables cultivated on a large scale; vegetables from market gardens—potatoes, cabbages, carrots, turnips, radishes, peppers, artichokes, cultivated mushrooms, water cresses, etc. Fresh specimens.

¹ Included in the class of tobacco manufacturers.

CLASS 45.—*Fruit trees and fruits.*

Species and varieties. Trees grown in the open; trees trained against the wall. Specimens of products grown on a large scale (orchards, orangeries)—apples and pears for cider, cherries, plums, oranges, lemons, almonds, nuts, etc. Specimens of products grown in gardens—fruits grown in the open; fruit grown against walls. New species and varieties.

CLASS 46.—*Trees, shrubs, ornamental plants, and flowers.*

Ornamental standard trees, seedlings or grafted. Ornamental shrubs, deciduous or evergreen. Plants for the park or for the garden. Herbaceous plants grown in open ground—dahlias, chrysanthemums, etc. Masses and baskets of flowers. Bouquets of natural flowers.

CLASS 47.—*Plants of the conservatory.*

Specimens of culture used in different countries for use or for ornament. Forced culture of vegetables and fruits; specimens of products. Species and varieties cultivated for ornament; plants from houses of moderate temperature; plants from hot-houses.

CLASS 48.—*Seeds and plants for gardens and nurseries.*

Collections of seeds of vegetables. Young trees, seedlings or grafted.

GROUP X.—FOOD STUFFS.

CLASS 55.—*Equipment and methods employed in the preparation of foods.*

Flour mills. Factories for the production of glucose and starch. Manufacture of food pastes. Bakeries—Kneading machines, mechanical ovens. Manufacture of ship biscuit. Pastry works. Manufacture and preservation of ice. Freezing machines and appliances. Equipment and methods used for preserving fresh meats, game, fish, etc. Factories for canning meat, fish, vegetables, and fruits. Sugar manufactories and refineries. Chocolate manufactories, confectioneries. Preparation of ices and sherbets. Decortication and roasting of coffee. Vinegar works. Distilleries. Breweries. Manufacture of aerated waters. Various industries for the preparation of foods.

CLASS 56.—*Farinaceous products and their derivatives.*

Flour from cereals—Grains from which the hulls have been removed, groats, potato starch, rice flour, flour from lentils and broad beans, gluten. Tapioca—Sago, arrowroot, various starches. Mixed farinaceous products. Italian pastes—Semolina, vermicelli, macaroni, noodles, infants' food, homemade pastes.

CLASS 57.—*Bread and pastry.*

Breads, with or without yeast, fancy breads, and breads in molds, compressed breads for travelers, military campaigns, etc. Ship biscuits. Pastry of various kinds peculiar to each country. Gingerbread and dry cakes for keeping.

CLASS 58.—*Preserved meat, fish, vegetables, and fruit.*

Meat preserved by freezing or by any other process, salted meats, canned meats, meat and soup tablets, meat extracts, various pork products; fish preserved by freezing, salt fish, fish in barrels, cod, herring, etc.; fish preserved in oil, tunny, sardines, anchovies; canned lobsters, canned oysters; vegetables preserved by various processes; fruits, dried and prepared—prunes, figs, raisins, dates; fruits preserved without sugar.



CLASS 59.—*Sugar and confectionery, condiments and relishes.*

Sugar for household and other uses; glucose; chocolate; confectionery, sugared almonds, bonbons, fondants, nougats, angelica, aniseed, preserves, jellies; fruits preserved in sugar; brandied fruits; coffee, tea, and aromatic drinks, chicory and sweet acorns; vinegar; table salt; spices—pepper, cinnamon, allspice, etc.; mixed condiments and relishes—mustard, curries, sauces, etc.

CLASS 60.—*Wines and brandies.*

Ordinary wines, red and white; sweet wines and boiled wines; sparkling wines; brandies.

CLASS 61.—*Sirups and liqueurs, distilled spirits, commercial alcohol.*

Sirups and sweet liqueurs—anisette, curaçoa, ratafia, chartreuse, etc. Aperients having alcohol as a base—absinthe, bitters, etc. Aperients having wine as a base—vermouth, byrrh, etc. Commercial alcohols—alcohols made from beets, molasses, grains, potatoes, etc. Various distilled spirits—gin, rum, tafia, kirsch wasser, etc.

CLASS 62.—*Various beverages.*

Cider and perry; ale, beer, and other malt liquors; fermented drinks of every kind; aerated waters.

KEY TO INSTALLATION OF EXHIBITS.

GROUPS VII AND X.

FISH FOODS.

Case 1:

Canned crabs, shrimp, fish, etc., Barataria Canning Company, Biloxi, Miss.
Canned clams and clam juice, J. H. Doxsee & Sons, Islip, N. Y.
Canned fish, etc., Kemp, Day & Co., New York.
Shredded codfish and boned herring, J. W. Beardsley's Sons, New York.
Deviled crabs, McMenamin & Co., Hampton, Va.
Finnan haddie in tin, J. R. Neal & Co., Boston, Mass.
Canned salmon, M. J. Kinney & Co., Boston, Mass.
American sardines, E. S. Russell & Co., Boston, Mass.

Case 2:

Canned salmon, Alaska Packers' Association, San Francisco, Cal.
Canned salmon, Pacific Steam Whaling Company, San Francisco, Cal.

Case 3:

Canned fish soup, Curtice Brothers Company, Rochester, N. Y.
Sardines, California Fish Company, Los Angeles, Cal.
Models of food fishes of United States, U. S. Fish Commission, Washington, D. C.

Case 4:

Canned fish, Martin Wagner & Co., Baltimore, Md.
Smoked halibut, Wonson & Son, Gloucester, Mass.
Canned salmon, Sacramento River Packers' Association, San Francisco, Cal.

Case 5:

Model of Gloucester fishing schooner, State of Massachusetts.
Clipper schooner *Nannie C. Bohlin*, of Gloucester, Mass., built in 1890 for the fresh halibut fishery on the Grand Banks of Newfoundland and other distant fishing grounds.

Case 6:

Models of pound nets, U. S. Fish Commission, Washington, D. C.

Pedestal: Eel pots, Hooper Manufacturing Company, Baltimore, Md.

Case 7: Canned salmon, Alaska Packers' Association, San Francisco, Cal.*Case 8:*

Eel Pots, Hooper Manufacturing Company, Baltimore, Md.

Pedestal: Models of submerged fish traps, U. S. Fish Commission, Washington, D. C.

Case 9:

Model of Gloucester fishing schooner, State of Massachusetts.

Schooner *Harry L. Belden*, Gloucester, Mass., built at Essex, Mass., in 1889, from designs by the late D. J. Lawler, for the deep-sea fishery in winter and the mackerel purse-seine fishery in summer.

Case 10: Wells & Richardson.*Case 11:* Evaporated cream, St. Charles Condensing Company, St. Charles, Ill.*Case 12:*

Dairy appliance, Emil Greiner, New York City.

Cheese coating, Standard Oil Company, New York City.

Dairy appliance, C. G. Wichson & Co., San Francisco, Cal.

Electrical temperature indicator, Wilder Manufacturing Company, Springfield, Mass.

Butter, Simpson, McIntire & Co., Boston, Mass.

Case 13:

Milk cooler and bottling machine, Star Milk Cooler Company, Haddonfield, N. J.

Churn, Aspinwall Manufacturing Company, Jackson, Mich.

Milk coolers, Champion Milk Cooler Company, Cortland, N. Y.

Felt jackets for milk cans, Thomas Williams, Brooklyn, N. Y.

Dairy appliance, Moseley & Stoddard Manufacturing Company, Rutland, Vt.

Separator and pasteurizer, A. H. Reid, Philadelphia, Pa.

Case 15: (*See Food mills.*)*Case 16:*

Separators, churns, etc., Vermont Farm Machine Company, Bellows Falls, Vt.

Pedestal:

Dairy appliance, American Separator Company, Bainbridge, N. Y.

Dairy appliance, Elgin Manufacturing Company, Elgin, Ill.

Case 17:

Model of creamery, etc., Cornish, Curtiss Green Manufacturing Company, Fort Atkinson, Wis.

Dairy appliance, J. F. Johnson & Co., Racine, Wis.

Case 18:

Dairy appliance, Vermont Farm Machine Company, Bellows Falls, Vt. D. H. Burrell & Co.

Model cream ripener, Cornish & Co., Rochester, N. Y.

Case 20: (*See Meat exhibit.*)*Case 21:*

Evaporated cream, Russell Cream Company, San Francisco, Cal.

By-products of dairies, William A. Hall, Bellows Falls, Vt.

Crystallized eggs, egg food, etc.

Case 22:

Condensed and evaporated milk and cream, Borden's Condensed Milk Company, New York City.

Condensed and evaporated milk and cream, American Condensed Milk Company, San Francisco, Cal.

Evaporated cream, Helvetia Milk Condensing Company, Highland, Ill.

Condensed milk, Maine Condensed Milk Company, Whitefield, N. H.

Case 22—Continued.

Condensed milk, Pacific Coast Condensed Milk Company, Seattle, Wash.
 Condensed milk, Vermont Condensed Milk Company, Richmond, Vt.
 Butter tubs and boxes, Nelson, Hall & Co., Montgomery, Vt
 Dairy supplies, Dairymen's Supply Company, Philadelphia, Pa.

Case 23:

Dairying by-products, William A. Hall, Bellows Falls, Vt.

Case 24:

Milk and milk products, Walker-Gordon Laboratory Company, Boston, Mass.
 Photographs of milk supply to cities, Fairfield Dairy Company, Montclair, N. J.
 Photographs and dairy appliances, H. B. Gurler, Dekalb, Ill.
 Milk pails, National Specialty Company, Racine, Wis.

Case 25: Collection dairy exhibit.*Cases 29, 31:* United States Department of Agriculture.*Case 36:* Cheese, A. D. De Land, Sheboygan, Mich. (Refrigerator.)*Case 189:* Churn, separators, dog powers, etc., Vermont Farm Machine Company. (Platform.)*Case 191:* Incubators, brooders, etc., Reliable Incubator and Brooder Company, Quincy, Ill.

MEAT EXHIBITS.

Case 19: Gelatins, Michigan Carbon Works, Detroit, Mich.*Case 20:* Index case of meat products.*Case 25:* Inedible animal products, Armour Packing Company, Kansas City, Mo.*Case 26:*

Canned meat, etc., Richardson & Robbins, Dover, Del.
 Soups, Joseph Campbell Preserving Company, Camden, N. J.
 Soups and deviled meats, J. H. Huckings & Co., Boston, Mass.
 Tamales, soups, etc., J. X. L. Tamale Company, San Francisco, Cal.

Case 27:

Canned meats and soups, Van Camp Packing Company, Indianapolis, Ind.
 Canned meats and soups, Franco-American Food Company, Jersey Heights, N. J.

Case 28:

Canned meats and sausages, German-American Provision Company, Chicago, Ill.
 Canned meats and sausages, Curtice Brothers Company, Rochester, N. Y.
 Canned meats and sausages, N. Goetjean, San Francisco, Cal.

Cases 29, 30: Instrument and papers, United States Department of Agriculture, Washington, D. C.*Case 32:* Photographs, United States Department of Agriculture, Washington, D. C.*Case 33:* Inedible animal products, Armour & Co., Chicago, Ill.*Cases 34 and 35:* Canned meats, etc., Armour & Co., Chicago, Ill.*Case 36 (refrigerator):* Collective exhibit dairy products, eggs, etc.

Armour Packing Company, Kansas City, Mo. Meats.
 Armour & Co., Chicago, Ill.
 Hams, lard, etc., Swift & Co., Chicago, Ill.
 Libby, McNeill & Libby, Chicago, Ill.

Cases 37, 38: Canned meats, etc., Armour Packing Company, Kansas City, Mo.*Case 39:* United States Department of Agriculture, Washington, D. C.*Case 40:* Instruments and papers, United States Department of Agriculture, Washington, D. C., illustrating meat inspection, Bureau of Animal Industry.*Case 47:* Model of refrigerator railway car, Swift & Co., Chicago, Ill.*Case 48:* Canned meats, hams, lard, etc., Swift & Co., Chicago, Ill.*Case 50:* Model of packing house in operation, Libby, McNeill & Libby.*Case 51:* Canned meats and soups, smoked meats, sausages, Libby, McNeill & Libby, Chicago, Ill.

BEE-KEEPING AND ENTOMOLOGY.

Case 13:

Beehives and sectional honey boxes, W. F. Falconer Manufacturing Company, Jamestown, N. Y.

Beehives, The A. I. Root Company, Medina, Ohio.

Case 14:

Comb foundation, etc., Charles Dadant & Son, Hamilton, Ill.

Book on bee culture, The A. I. Root Company, Medina, Ohio.

Queen bee cages, etc., bulletin on bee culture, Frank Benton, Washington, D. C.

Cases 131 to 134: Entomological preparations.

Case 191: Models and photographs, illustrated. Warfare against gypsy moth. State Board of Agriculture, Malden, Mass.

GRAINS AND CEREALS.

Cases 41, 42, 43, 52, 56, 57, 58, 59, 61, 62, 63, 64, 68, 69, 70, 74, 81, 82, 83: Government collections of grains, United States Department of Agriculture, Washington, D. C.

CEREAL FOODS.

Case 60:

Infants' and invalids' food, Health Food Company, New York City.

Germea, Sperry Flour Company, San Francisco, Cal.

Maize products for food and brewing, Indianapolis Hominy Mills, Indianapolis, Ind.

Fruentum corn flakes and corn flour, United States Fruentum Company, Detroit, Mich.

Starches, corn oil, etc., National Starch Manufacturing Company, New York City.

Case 65: Cereal products, Washburn-Crosley Company, Minneapolis, Minn.; Pillsbury-Washburn Flour Company, Minneapolis, Minn.

Case 66: Flour, Alliance Milling Company, Denton, Tex.

Case 67: Flour, cereals, and whole grains, Del Mont Milling Company, San Francisco, Cal.

Case 71: Flour, Pillsbury-Washburn Flour Company, Minneapolis, Minn.; Washburn-Crosby Company, Minneapolis, Minn.

Case 72:

Shredded wheat products, Cereal Machine Company, Worcester, Mass.

Grape nuts, cereal coffee, etc., Postum Cereal Company, Battle Creek, Mich.

Case 73: United States Department of Agriculture, Washington, D. C.

Case 75: Corn products and by-products.

Cases 76, 80: Collection of cereal products, American Cereal Company, Chicago, Ill.

Case 77: Cereal products and health foods, Battle Creek Sanitarium Health Food Company, Battle Creek, Mich.

Case 78: Starches, gluten food, gluten meal, corn cake, etc., National Starch Manufacturing Company, New York City.

Case 79: Bakery goods, biscuits, cakes, etc., National Biscuit Company, New York, and Chicago, Ill.

Case 92: Hulled corn, Cereal Food Company, Peoria, Ill.

MISCELLANEOUS VEGETABLE PRODUCTS.

Case 84: Collection California dried fruits.

Case 85: American teas, South Carolina Tea Garden.

Case 86: White corn products, Decatur Cereal Mill Company, Decatur, Ill.

Case 87: Index of grain exhibit.

Case 88:

Preserved fruits, maple sirup, etc., Curtice Bros. Company, Rochester, N. Y.
Canned fruits, J. H. Flickinger Company, San Jose, Cal.

Case 89:

Soups, tomato ketchups, Joseph Campbell Preserve Company, Camden, N. J.
Canned fruits and vegetables, Erie Preserving Company, Buffalo, N. Y.
Canned vegetables, Paul Taylor Brown, New York City.
Canned vegetables and fruits, Geneva Preserving Company, Geneva, N. Y.
Canned vegetables and fruits, Curtice Bros. Company, Rochester, N. Y.
Grape juice, Welsh Grape Juice Company, Westfield, N. J.

Cases 90, 91: Collection California dried fruits.

Case 92:

Canned asparagus, Hickmott Canning Company, San Francisco, Cal.
Wahl's Vegetable Bouillon Stock, Bouillon Stock Manufacturing Company, Chicago, Ill.
Table sauce, Oscar of Waldorf-Astoria, New York City.
Canned apples, Erie Preserving Company, Buffalo, N. Y.
Table sauce, George Williams, Los Angeles, Cal.

Case 94:

Canned fruits, J. H. Flickinger Company, San Jose, Cal.
Canned fruits, jams, etc., California Canneries Company, Limited.

Case 95: Cocoa and chocolate preparations, Walter Baker Company, Limited.

Case 96: Screen: photos.

Case 97: Pickles, preserves, and food products, H. J. Heinz Company, Pittsburg, Pa.

Case 98: Cotton-seed oils, cake meal, linters, and soaps, American Cotton Oil Company, New York City.

Case 99:

Pickles, W. D. Richardson, Fredericksburg, Va.
Prepared mustards, Charles Gulden, New York City.
Olives, pim-olas, etc., Seville Packing Company, New York City.

Case 100: Pickles, etc., H. J. Heinz Company, Pittsburg, Pa.

Case 101: Preserves, jams, condiments, and relishes, California Packing Company.

Case 102:

Olive oil, Ackman & Tuftley, Los Angeles, Cal.
Olive oil, Ekman & Stow, Oroville, Cal.
Olive oil, California Packing Company, San Francisco, Cal.
Olive oil, Ellwood Cooper, Santa Barbara, Cal.
Plants (aromatic and medicinal), volatile oils and model of distilling plant, A. M. Todd, Kalamazoo, Mich.

Case 103:

Dried and evaporated fruits, New York State Commission, representing Petri Fruit Company, Bone Bros., W. E. Schaeffer (Wayne County exhibitors).
Legumes, Trumbull & Beebe, San Francisco, Cal.
Salts, Crystal Salt Works, Los Angeles, Cal.
Salts, Pioneer Salt Works, Mount Eilen, Cal.
Salts, Redondo Salt Works, Los Angeles, Cal.
Salts, Southern California Salt Company, Los Angeles, Cal.
Salts, Union Pacific Salt Works, San Francisco, Cal.

Cases 104, 105: Storage cases.

WINES AND LIQUORS.

Case 93: Cocktails and whiskies, G. F. Heublein & Bro., Hartford, Conn.

Case 106: Liquors, cordials, bitters, etc., Reinstrom, Bettman, Johnson & Co.

Case 107:

Bourbon whisky, J. W. McCulloch, Owensboro, Kv.
 Rye whisky, H. B. Kirk & Co., New York City.
 Rye whisky, Joseph Beck & Co., New York City.

Cases 108, 109, 110, 111:

American Brewing Company, Rochester, N. Y.
 J. & P. Baltz Brewing Company, Philadelphia, Pa.
 Beadleston & Woerz, New York City.
 Bolen & Byrne Manufacturing Company, New York City.
 Christian Feigenspan Brewing Company, Newark, N. J.
 Goebel Brewing Company, Detroit, Mich.
 John Gund Brewing Company, La Crosse, Wis.
 Heissler and Jung Company, Chicago, Ill.
 Christian Heurich Brewing Company, Washington, D. C.
 Indianapolis Brewing Company, Indianapolis, Ind.
 Lembeek & Betz Eagle Brewing Company, Jersey City, N. J.
 S. Liebmans's Sons Brewing Company, Brooklyn, N. Y.
 Long Island Brewing Company, Brooklyn, N. Y.
 Quinpiac Brewing Company, New Haven, Conn.
 San Francisco Breweries, Limited, San Francisco, Cal.
 P. Schoenhofen Brewing Company, Chicago, Ill.
 Seattle Brewing Company, Seattle, Wash.

Case 112:

Rye whisky, David Netter & Co., Philadelphia, Pa.
 Bourbon whisky, Bernheim Bros., Louisville, Ky.
 Rye whisky, Large Distilling Company, Pittsburg, Pa.
 Bourbon whisky, Stitzel Bros., Louisville, Ky.
 Rye whisky, Maryland Distilling Company, Baltimore, Md.
 Rye whisky, Meadville Distilling Company, Vallonia, Pa.
 Malt whisky, Victor Malt Whisky Company, San Francisco, Cal.
 Rye whisky, Steinhart Bros., New York City.

Case 113: Ginger ale, sarsaparilla, and sparkling soda and seltzer water, Vartray Water Company, Buffalo, N. Y.*Cases 114, 115, 116, 117, 118, 119, 121:* Collective exhibit of wines, California Paris Exposition Commission, San Francisco, Cal.*Case 120:* Collective exhibit of brandies, California Paris Exposition Commission, San Francisco, Cal.*Case 122:* Rye whiskies, Cook & Bernheimer, New York City.*Case 123:* Collective exhibit of wines, California Paris Exposition Commission.*Case 124:* Lager beer, American Brewing Company, Rochester, N. Y.*Case 125:*

Wines, New Hammondsport Wine Company, Hammondsport, N. Y.
 Wines, Monticello Wine Company, Charlottesville, Va.
 Wines, Pleasant Valley Wine Company, Rheims, N. Y.
 Wines and brandies, San Luis Vineyard, Tallahassee, Fla.
 Brandies, Florida Brandy Distilling Company, Tallahassee, Fla.
 Malt extract, Heissler & Jung Company, Chicago, Ill.
 Bourbon whiskies, Bernheim Bros., Louisville, Ky.

Case 126:

Wines, To-Kalon Wine Company, Washington, D. C.
 Collective exhibit of wines, California Paris Exposition Commission.

Case 127:

Wines, Empire State Wine Company, Penn Yan, N. Y.
 Wines and brandies, Engel & Krudwig Wine Company, Sandusky, Ohio.

Case 127—Continued.

Wines, Brotherhood Wine Company, New York City.

Wines and brandy, H. T. Dewey Sons & Co., New York City.

Case 128:

Wines, Christian Xander, Washington, D. C.

Wines and brandies, Germania Wine Cellars Company, Hammondsport, N. Y.

Wines, Urbana Wine Company, Urbana, N. Y.

Wines and brandies, Garrett & Co., Weldon, N. C.

Wines, Lake Keuka Wine Company, Hammondsport, N. Y.

Wines and brandy, M. Hommell, Sandusky, Ohio.

Case 129: Fruit sirups and soft drinks, N. T. Bradley, Clearfield, Pa.

Case 130: Storage case.

RETROSPECTIVE EXHIBIT.

Cases 135 to 144: Models and pictures illustrating the history of harvesting machinery from the earliest times, Deering Harvester Company, Chicago, Ill.

TOBACCO EXHIBIT.

Cases 145 to 155:

Collective exhibit of leaf tobaccos, the contributors to which were as follows:

United States Department of Agriculture, Washington, D. C.

Leaf tobacco, Baltimore Leaf Tobacco Association, Baltimore, Md.

Leaf tobacco, Joseph Bimberg, Elmira, N. Y.

Porto Rican tobacco, Levi Blumenstiel & Co., New York City.

White Burley tobacco, Cincinnati Leaf Tobacco Warehouse Company, Cincinnati, Ohio.

Export and manufacturing tobacco, M. H. Clark & Bro., Clarksville, Tenn.

Various native tobaccos, Cullman Bros., New York City.

North Carolina tobaccos, Col. J. L. Cunningham, Cunningham, N. C.

Virginia leaf, Dibrell Bros., Danville, Va.

Florida tobaccos, Florida Habana Company, Quincy, Fla.

Virginia export tobaccos, Hogan-Dart Tobacco Company, Richmond, Va.

Export tobaccos, Hoge, Irwin & Co., Kingston, N. C.

North Carolina tobaccos, J. T. Jordan, Greensboro, N. C.

Leaf tobaccos, Felix Littman, Quincy, Fla.

Leaf tobaccos, Louisville Tobacco Exchange, Louisville, Ky.

Florida leaf from foreign seed, Owl Tobacco Company, Quincy, Fla.

Tobacco grown in Texas from Cuban seed. Spiller & Robinson, Ada, Tex.

Bright and dark Virginia leaf, L. L. Strauss, Richmond, Va.

Tobaccos grown in various parts of the Union, Sutter Bros., New York City.

Texas leaf tobaccos, Texas Tobacco Growers' Association, Houston, Tex.

Leaf, plug, and fine cut tobacco in process of manufacture, United States Tobacco Company, Richmond, Va.

Light, mahogany, and dark Virginia tobaccos, E. K. Vietor & Co., Richmond, Va.

Bright North Carolina tobaccos, W. A. Wilkins, Winston, N. C.

Various grades of Virginia tobaccos, F. S. Williams & Co., Danville, Va.

FORAGE AND FOOD OF ANIMALS.

Case 156:

Dairy stock and poultry foods, American Cereal Company, Chicago, Ill.

Cotton-seed cake, hulls, and meal, seed hulls for fertilizers, feeding, etc., Union Oil Company, New Orleans, La.

Cases 157, 158: Collective exhibit of the natural grasses and forage plants, arranged upon framed panels, with miniature bales of the "hay" beneath, United States Department of Agriculture, Washington, D. C.

Case 159:

Ground clover poultry food, Bennett & Millett Company, Gouverneur, N. Y.
 Gluten meal, corn cake, etc., National Starch Manufacturing Company, New York City.

Case 160:

Seeds of commercial importance in the United States and in the export trade, Albert Dickinson Company, Chicago, Ill.
 Food for cattle, International Food Company, Minneapolis, Minn.
 Dog, poultry, and game foods, Spratts Patent, Limited, New York City.

Case 161: Alfalfa, timothy seed, etc., C. A. Smurthwaite Produce Company, Ogden, Utah.

Case 162: Collection of seeds of forage plants, grasses, etc., and other seeds used as food for animals, United States Department of Agriculture, Washington, D. C.

Case 188 (Platform): Stock foods, meal, baled hay, and model of hay barn, Scott & Magner, San Francisco, Cal.

SUGARS, CONFECTIONERY, ETC.

Case 163:

Maple sirups, Welch Maple Sugar Company, Burlington, Vt.
 Maple sirups, Towle Syrup Company, St. Paul, Minn.
 Maple sirups, Albert J. Thrasher, Pittsburg, Pa.

Case 164:

Cane sugar and molasses, L. M. Soniat, Dorceyville, La.
 Graded beet sugars, Michigan Beet Sugar Association, Detroit, Mich.
 Milk sugar, Hayne and Whitaker, Antwerp, N. Y.
 Cane sugar, molasses, etc., Louisiana Sugar Planters' Association, New Orleans, La.

Case 167:

Beet sugar and beet products, Spreckels Sugar Company, Salinas, Cal.
 Satin-finish stick candy, etc., Dilling & Co., Marion, Ind.

Cases 168, 169:

Crystallized glacé fruits, Bishop & Co., Los Angeles, Cal.
 Collective exhibit crystallized glacé fruits and flowers, California, Paris Exposition Commission.

Case 176:

Candies and confections, Pan Confection Company, Chicago, Ill.
 Chewing gum and aromatic cachous, Sen Sen Company, New York City.

MINERAL WATER, ETC.

Case 165:

Sparkling and soda water, seltzer, sarsaparilla, and ginger ale, Vartray Water Company, Buffalo, N. Y.
 Mineral water, Bear Lithia Water Company, Bear Lithia, Va.

Case 166: Mineral water, Lincoln Mineral Spring Company, Saratoga Springs, N. Y.;
 Natural Mineral Water Co., Saratoga Springs, N. Y.

MINERAL WATERS, CIDER, ETC.

Case 171: Mineral spring water, White Rock Mineral Spring Company, Waukesha, Wis.

Case 172: Ciders, Bolen & Byrne Manufacturing Company, New York City; Clarksville Cider Company, St. Louis, Mo.

Cases 173 to 175: Exhibition of mineral waters and similar products, as follows:

Mineral water:

Ætna Mineral Water Company, Ætna Springs, Cal.
 Almanaris Mineral Spring Company, Waukesha, Wis.
 Allouez Mineral Spring, Green Bay, Wis.
 Bartlett Mineral Water Company, Bartlett Springs, Cal.
 Bethesda Mineral Water Company, Waukesha, Wis.
 Bythinia Mineral Water Company, ———, Cal.
 French Lick Springs, French Lick, Ind.
 Lytton Springs Sanitarium, Lytton Springs, Cal.
 Santa Barbara Mineral Water Company, Santa Barbara, Cal.
 Taskinas Mineral Spring Company, Boston, Mass.
 Taylor & Jorgensen Company, New York City.

Sulphurous waters, Greenbrier White Sulphur Springs, White Sulphur Springs, W. Va.

Natural aerated water, G. H. T. Jackson, Napa Soda Springs, Cal.

Cases 176 to 187: United States Experiment Station. Exhibit of the Association of Agricultural Experiment Stations of the United States, comprising instruments, models, products, books, charts, and photographs.

FOOD MILLS.

Case 15: Rolling pins, Reusch Brothers, Chicago, Ill.

Case 190: Ice-cream freezers, North Brothers Manufacturing Company, Philadelphia, Pa.

Case 191: Food mills, etc., Enterprise Manufacturing Company, Philadelphia, Pa.

FERTILIZER EXHIBITS.

Case 192:

Phosphate rock, Central Phosphate Company, Mount Pleasant, Tenn.
 Phosphate rock, Perry Phosphate Company, Nashville, Tenn.

Case 193:

Fertilizers.—Virginia-Carolina Chemical Company, Richmond, Va.; Ashepoo Fertilizer Company, Charleston, S. C.; Bayle & Lacosta, San Francisco, Cal.

Phosphates, Auchincloss Brothers, New York City.

Case 194:

Fertilizers, Kaufman Fertilizer Company, Indianapolis, Ind.
 Blood and tankage fertilizers, Armour Fertilizer Company, Chicago, Ill.

Cases 195 to 197: Taken out of the space.

FIBER COURT.

Cases 198, 199, 202; part of 203: Wools.—Collective exhibit of 300 samples of wools. (See chapter on fiber court, United States Department of Agriculture, Washington, D. C.)

Case 200: Cotton.—Collective exhibit of cotton samples. (See chapter on fiber court, United States Department of Agriculture, Washington, D. C.)

Case 201:

Moss and vegetable hair, Louis Kohlman, New Orleans, La.
 Flax and ramie exhibit, United States Department of Agriculture, Washington, D. C.

Case 203:

Wool, United States Department of Agriculture. (See above.)
 Binding twine and cordage from sisal and manila hemp, Columbia Cordage Company, Auburn, N. Y.
 Binding twine, Aultman, Miller & Co., Akron, Ohio.

Case 204: Taken out of this space.

Case 205: McCormick Harvester Machine Company. Binding twine.

Case 206: Cotton in bales, Indo-Egyptian Compress Company, New York and Boston, Mass.

Case 207: Cotton photographs, United States Department of Agriculture, Washington, D. C.

Case 208: American matting, Northwest Grass Twine Company, St. Paul, Minn.

Case 209: Exhibit illustrating the manufacture of binding twine, Deering Harvester Company, Chicago, Ill.

Case 210: Models of ancient and modern compresses, also of car and wagon, Southern Railway, Washington, D. C.

Case 111: Commercial collection of sea-island cottons, W. W. Gordon & Co., Georgia.

AGRICULTURAL IMPLEMENTS.

First floor.

1. Harvesting machinery, Plano Manufacturing Company, Chicago, Ill.
2. Mowing, reaping, and binding machines, Aultman, Miller & Co., Akron, Ohio.
3. Mowers, reapers, etc., Adriansce, Platt & Co., Poughkeepsie, N. Y.
4. Harvesting machinery, McCormick Harvesting Machine Company, Chicago, Ill.
5. Harvesting machinery, etc., Deering Harvester Company, Chicago, Ill.
6. Plows and agricultural implements, Deere & Co., Moline, Ill.
7. Farm machinery, etc., Syracuse Chilled Plow Company, Syracuse, N. Y.

Second floor.

8. Harvesting machinery, etc., Johnson Harvester Company, Batavia, N. Y.
9. Agricultural machinery, D. M. Osborne & Co., Auburn, N. Y.
10. Feed mills, windmills, etc., The Stover Manufacturing Company, Freeport, Ill.
11. Agricultural machinery, Wardner, Bushnell & Glessner Company, Chicago, Ill.
12. Harvesting machinery, Walter A. Wood Mowing and Reaping Machine Company, Hoosick Falls, N. Y.
13. Hair and wool clipping machines, etc., Chicago Flexible Shaft Company, Chicago, Ill.
14. Plows, Oliver Chilled Plow Company, South Bend, Ind.
15. Farm machinery, Milwaukee Harvester Company, Milwaukee, Wis.
16. Hay presses, Whitman Agricultural Company, St. Louis, Mo.
17. Farm implements, Whittington & Cooley Manufacturing Company, Jackson, Mich.

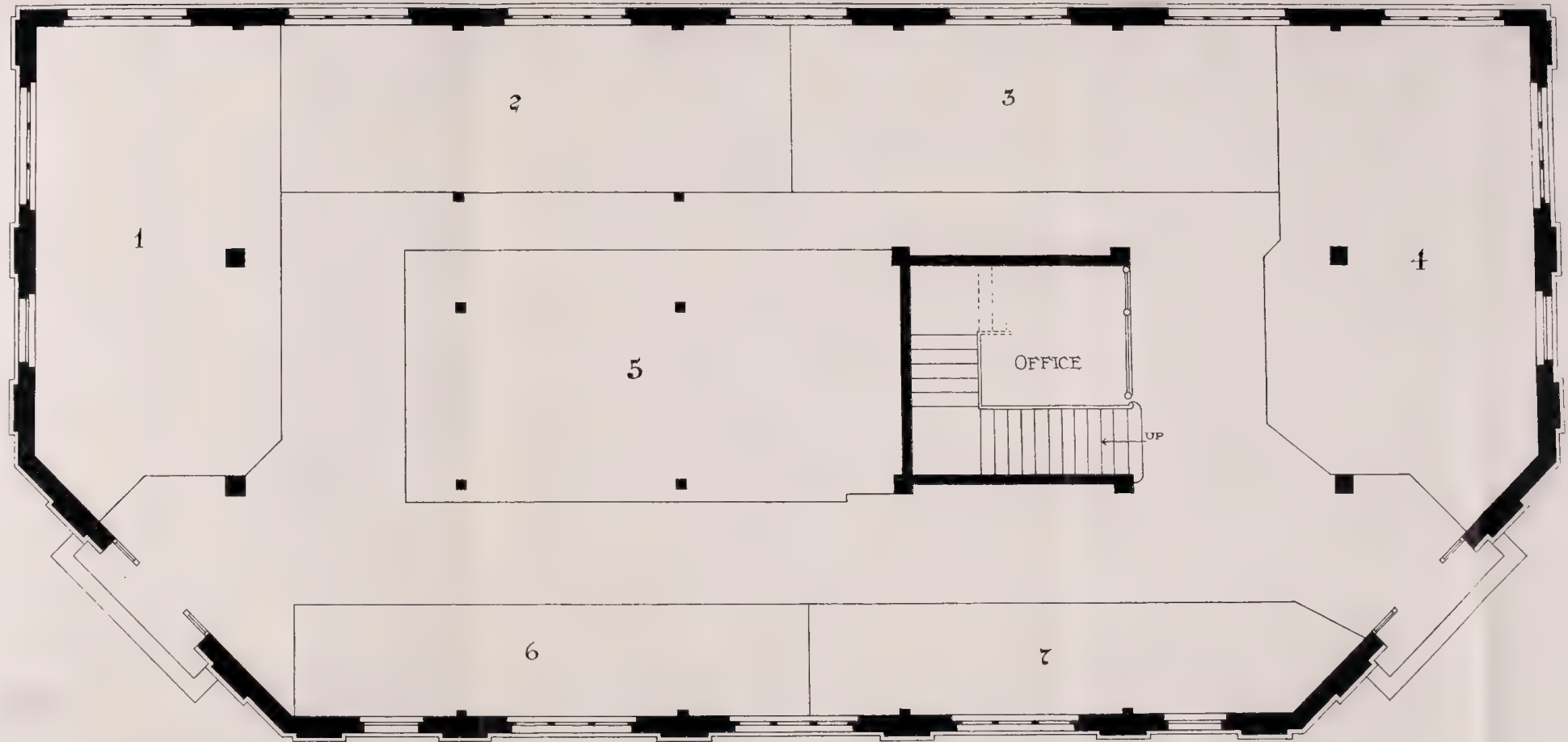
Third floor.

18. Pickles, preserves, etc., H. J. Heinz Company, Pittsburg, Pa.
19. Incubators, brooders, etc., Geo. M. Ertels Company, Quincy, Ill.
20. Lawn mowers, Caldwell Lawn Mower Company, Newburg, N. Y.
21. Models of the machines of Cyrus H. McCormick, etc., McCormick Harvesting Machine Company, Chicago, Ill.
22. Mower and binder knives, etc., Whitman & Barnes Company, Akron, Ohio.
23. Cream separators, P. M. Sharples, West Chester, Pa.
24. Model of corn harvester, Deering Harvester Company, Chicago, Ill.
25. Fanning mill and separator, Johnson & Field Manufacturing Company, Racine, Wis.

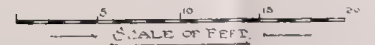
GROUP VIII.—HORTICULTURE AND ARBORICULTURE, COMPRISING CLASSES 43 TO 48, INCLUSIVE.

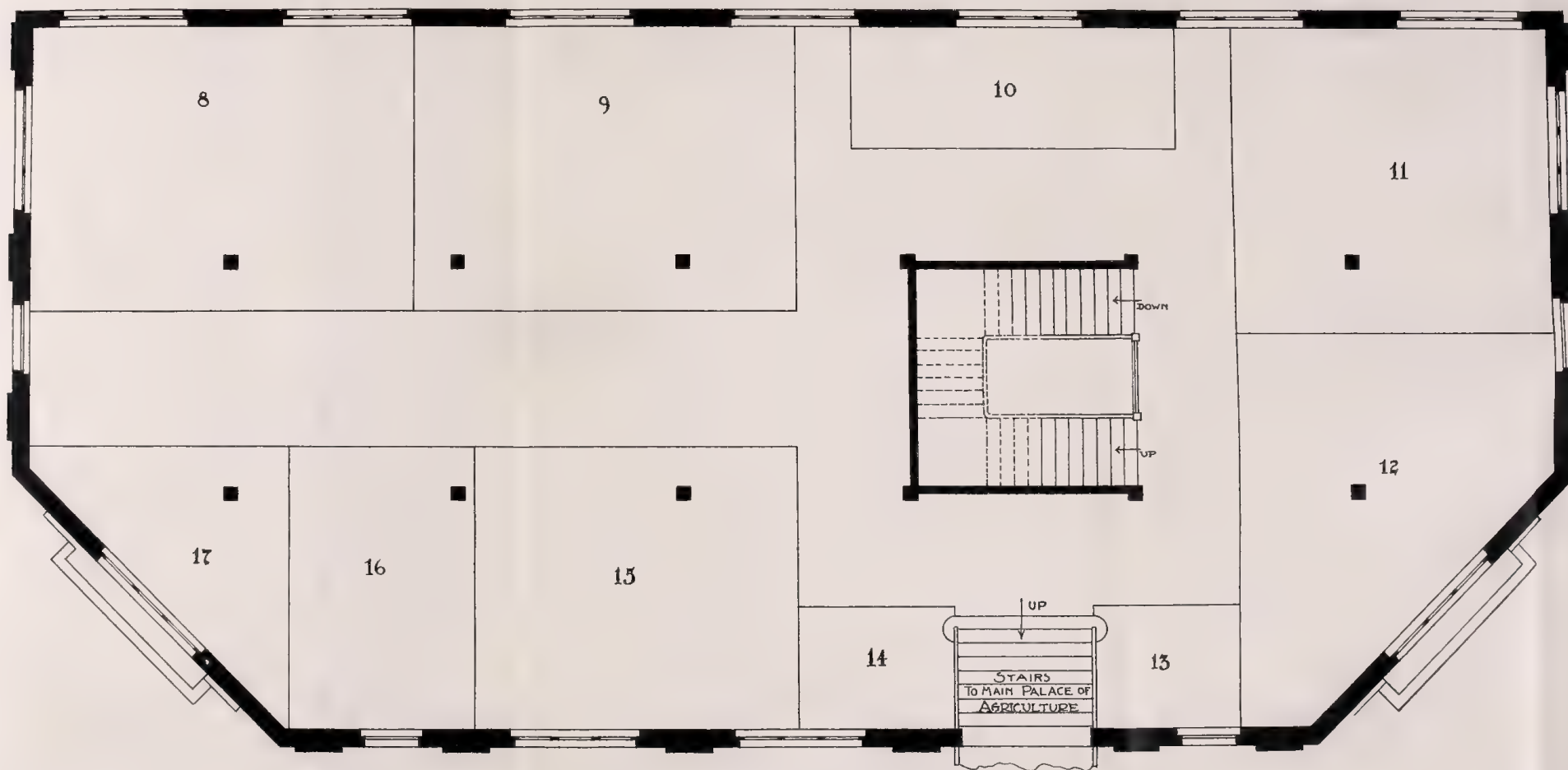
Case 1: Coldwell Lawn Mower Co., Newburg, N. Y. Lawn mowers.

Case 2: S. L. Allen & Co., Philadelphia, Pa. Automatic exhibit horticultural implements, comprising Planet, Jr., seed drills, wheel hoes, hand cultivators, horse hoes, etc.

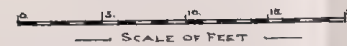


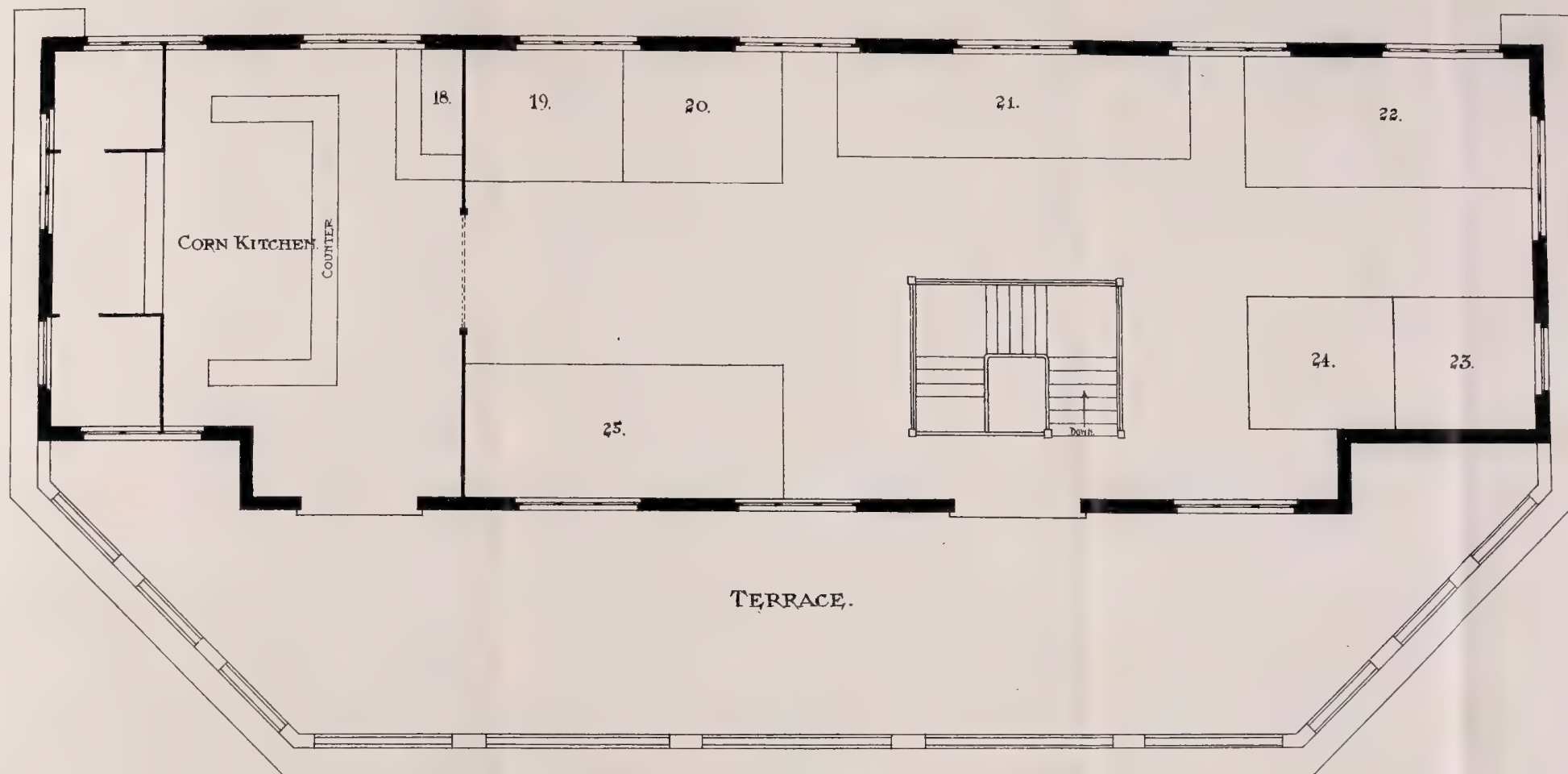
PARIS EXPOSITION OF 1900.
PLAN OF INSTALLATION ON GROUND FLOOR
UNITED STATES ANNEX OF AGRICULTURE.
GROUPS VII & X.





PARIS EXPOSITION OF 1900
 PLAN OF INSTALLATION ON FIRST FLOOR
 UNITED STATES ANNEX OF AGRICULTURE
 GROUPS VII & X



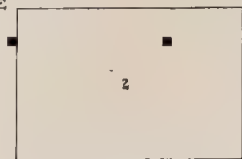
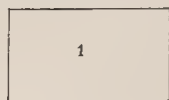


PARIS EXPOSITION OF 1900.
 PLAN OF INSTALLATION ON SECOND FLOOR
 UNITED STATES ANNEX OF AGRICULTURE.
 GROUPS VII & X.

0 5 10 15 20
 — Scale of Feet —

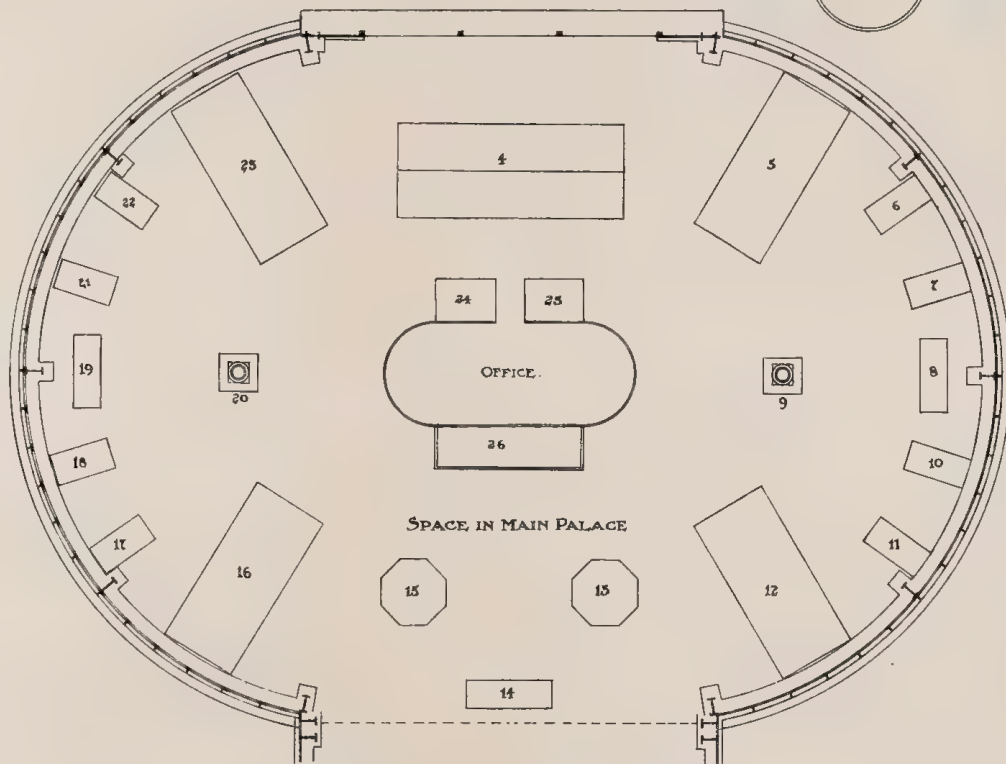
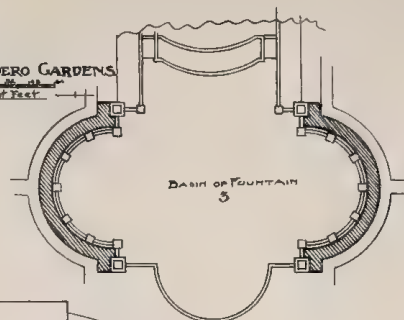
SPACE, BELOW MAIN PALACE

Scale in Feet.



SPACE IN TROCADERO GARDENS

Scale of Feet.



PARIS EXPOSITION OF 1900.
PLAN OF INSTALLATION IN
UNITED STATES SPACES or HORTICULTURE.
GROUP VIII.

Scale of Feet.

Case 3:

Michigan Seed Company, South Haven, Mich. Gladioli and dahlias.
 Lothrop & Higgins, East Bridgewater, Mass. Dahlias.

(These exhibits were planted in narrow beds beside the basin of the Trocadero fountain as shown on shaded portion of plan.)

Case 4a: General collection of fresh fruits made up of single plates of the varieties shown in the several State exhibits. Reinstalled for each temporary competition.

Case 4b: Used successively for different exhibitors of fresh fruits in the temporary competitions.

Case 5: Used successively for different exhibitors of fresh fruits in the temporary competitions.

Cases 6, 7, 10, 11: Collection of about 800 facsimile models of the more important fruits grown in the United States; exhibited by Division of Pomology, United States Department of Agriculture.

Cases 8, 14, 19: Photographs in portfolios—

Albaugh-Georgia Orchard Company, Fort Valley, Ga.

Audubon Park Association, New Orleans, La.

Baron de Hirsch Agricultural Industrial School, Woodbine, N. J.

Bellefontaine Cemetery, St. Louis, Mo.

Burpee, W. Atlee, & Co., Philadelphia, Pa.

California commission to Paris Exposition.

California Nursery Company, Niles, Cal.

Cemetery of Spring Grove, Cincinnati, Ohio.

Connor, Washington E., New York City, N. Y.

Cooper, Elwood, Santa Barbara, Cal.

Department of Agriculture, United States of America, Division of Pomology, Washington, D. C.

Dintelmann, L. F., Belleville, Ill.

Dreer, Henry A., Philadelphia, Pa.

Florida East Coast Hotel Company, St. Augustine, Fla.

Graceland Cemetery, Chicago, Ill.

Griffing, Timothy M., Riverhead, N. Y.

Hunnewell, H. H., 130 Beacon street, Boston, Mass.

Johnson, F. C., Kishwaukee, Ill.

Lysle, Addison, Allegheny City, Pa.

Maryland Agricultural Experiment Station, College Park, Md.

Michigan Seed Company, South Haven, Mich.

Milwaukee Park Commission, Milwaukee, Wis.

National Cash Register Company, Dayton, Ohio.

Newby, Thomas T., Carthage, Ind.

Packard, A. S., Covert, Mich.

Pennsylvania Railroad Company, Philadelphia, Pa.

Postlethwaite, Harry, San Jose, Cal.

Roeding, George C., Fresno, Cal.

St. Paul Board of Park Commissioners, St. Paul, Minn.

Stevens, Mrs. Kinton, Montecito, Cal.

Studer, Nicholas, Washington, D. C.

University of Idaho, Moscow, Idaho.

Vaughan, J. C., Chicago, Ill.

Woodmere Cemetery, Detroit, Mich.

Cases 9, 20: Columns of oranges and lemons, exhibited by California State commission, June 1 to August 20.

Case 12: Continuous display of apples, crops of 1899 and 1900, made by Illinois State Horticultural Society.

Cases 13, 15: Continuous display of apples from various States, crops of 1899–1900, interspersed with fruits in preserving solution in glass jars, exhibited by California State Commission.

Case 16: Continuous display of apples, crops of 1899–1900, made by Missouri State Horticultural Society.

Case 17: Trumbull & Beebe, San Francisco, Cal., display of vegetable seeds.

Case 18: Michig. Seed Company, South Haven, Mich., display of vegetable and flower seeds, bulbs, etc., grown in Michigan and Florida.

Case 21: Collection of almonds and walnuts, exhibited by California State commission.

Case 22: Exhibits of pecans shown by the following:

A. G. Delmas, Scranton, Miss.

Herbert Post, Fort Worth, Tex.

Stuart Pecan Company, Ocean Springs, Miss.

Woldert Grocery Company, Tyler, Tex.

B. M. Young, Morgan City, La.

Case 23: Continuous display of fresh fruits, crops of 1899–1900, New York State Commission.

Cases 24, 25: Used successively for various exhibits of fresh fruits in the temporary competitions.

Case 26: Exhibits of apples, oranges, and lemons in commercial packages. About August 20 the columns of oranges and lemons (Nos. 9 and 20) were removed and replaced by temporary tables needed for the display of the large exhibits of fresh fruits of the crop of 1900, that came forward from various exhibitors during the remainder of the Exposition.

CATALOGUE OF EXHIBITS AND EXIBITORS IN GROUPS VII, VIII, AND X.

GROUP VII.—AGRICULTURE.

CLASS 35.—*Farm equipment and the methods of improving land.*

Adriance, Platt & Co., Poughkeepsie, N. Y.: Mowers, reapers, binders, harrows, and rakes.

Aermotor Company, The, Chicago: Windmills, pumps, tanks.

Armour Fertilizing Works, Chicago: Fertilizers, dried blood, tankage.

Ashepoo Fertilizer Company, Charleston, S. C.: Fertilizers.

Aultman, Miller & Co., Akron, Ohio: Buckeye mowing machine, Buckeye twine-binding harvester, Buckeye reaper.

Bayle & Lacosta, San Francisco, Cal.: Fertilizers.

Central Phosphate Company, Mount Pleasant, Tenn.: Phosphate rock.

Chicago Flexible Shaft Company, Chicago: Hair and wool clipping machines, carriage heaters.

Deere & Co., Moline, Ill.: Agricultural implements.

Deering Harvester Company, Chicago: Harvesting machinery, etc.

Department of Agriculture, United States, Division of Chemistry, Washington, D. C.: Collective exhibit of fertilizers and fertilizing materials.

Indo-Egyptian Compress Company, New York City: Compress for cotton, hay, hemp, sisal, rags.

Johnson & Field Manufacturing Company, Racine, Wis.: Fanning mill and separator.

- Johnston Harvester Company, Batavia, N. Y.: Harvesting machinery, farm tools.
- Kaufman Fertilizer Company, Indianapolis, Ind.: Fertilizer, from raw material to finished product.
- Kny Scheerer Company, 17 Park Row, New York City: Veterinary surgical instruments.
- McCormick Harvesting Machine Company, Chicago: Models of machines invented and developed by Cyrus H. McCormick and his successors. Harvesting machinery.
- Milwaukee Harvester Company, Milwaukee, Wis.: Farm machinery, harvesters, binders, reapers, and mowers.
- Osborne, D. M., & Co., Auburn, N. Y.: **Agricultural machinery.**
- Plano Manufacturing Company, Chicago: Harvesting machinery.
- Stover Manufacturing Company, Freeport, Ill.: Windmills, feed-grinding mills, hardware.
- Syracuse Chilled Plow Company, Syracuse, N. Y.: Farm machinery, plows, harrows, cultivators, etc.
- Virginia-Carolina Chemical Company, Richmond, Va.: Fertilizers.
- Warder, Bushnell & Glessner Company, Chicago: Champion binder, mowers, and reapers.
- Whitman Agricultural Company, St. Louis, Mo.: Presses for baling hay.
- Whitman & Barnes Company, Akron, Ohio: Mower and binder knives and sections. Twist drills, hammers, hatchets.
- Withington & Cooley Manufacturing Company, Jackson, Mich.: Forks, hoes, rakes, scythes, snaths, etc.
- Wood, Walter A., Mowing and Reaping Machine Company, Hoosick Falls, N. Y.: Harvesting machinery.

CLASS 36.—*Appliances and methods of viticulture.*

- Allen, S. L., & Co., Philadelphia, Pa.: Horse hoes for vine culture.
- Oliver Chilled Plow Company, South Bend, Ind.: Implements for vine culture.

CLASS 37.—*Appliances and methods used in agricultural industries.*

- American Separator Company, Bainbridge, N. Y.: Dairy appliances; cream separator.
- Aspinwall Manufacturing Company, Jackson, Mich.: Churn.
- Biesecker, J. S., New York City: Dairy appliances.
- Buhl Stamping Company, Detroit, Mich.: Dairy appliances and stable appliances.
- Champion Milk Cooler, Cortland, N. Y.: Milk and cream coolers.
- Cornish & Co., St. Paul, Minn.: Boyd cream vat.
- Cornish, Curtis & Green Manufacturing Company, Fort Atkinson, Wis.: Model of an American creamery, fully equipped; dairy appliances.
- Dairymen's Supply Company, The, Philadelphia, Pa.: Dairy machinery and supplies.
- Department of Agriculture, United States, Dairy Division, Bureau of Animal Industry, Washington, D. C.: Collective exhibit of dairy appliances; by-products of dairy industry.
- Elgin Manufacturing Company, The, Elgin, Ill.: Dairy appliances.
- Ertels, George M., Company, Quincy, Ill.: Incubators, brooders, poultry appliances.
- Fairfield Dairy Company, The, Montclair, N. J.: Photographs and models illustrating the work of a dairy and its fittings.
- Fitch, C. L., Fort Atkinson, Wis.: Scale for butter coloring.
- Greiner, Emil, New York City: Dairy appliances.
- Gurler, H. B., De Kalb, Ill.: Photographs of dairy and fittings; dairy appliances.
- Hall, William A., Bellow Falls, Vt.: Dairying by-products.

- Johnson, J. F., & Co., Racine, Wis.: Dairy appliances.
- Moseley & Stoddard Manufacturing Company, Rutland, Vt.: Dairy appliances.
- National Specialty Company, Racine, Wis.: Milk pails.
- Nelson, Hall & Co., Montgomery, Vt.: Butter tubs and boxes.
- Reid, A. H., Thirtieth and Market streets, Philadelphia, Pa.: Milk separators, hand and power, pasteurizers.
- Reliable Incubator and Brooder Company, Quincy, Ill.: Incubators and brooders, models, poultry appliances.
- St. Louis Dairy Company, St. Louis, Mo.: Photographs. Plant, equipment, and work of handling milk in a city.
- Sharples, P. M., West Chester, Pa.: Cream separators.
- Star Milk Cooler Company, The, Haddonfield, N. J.: Milk cooler, bottling machine, etc.
- Vermont Farm Machine Company, Bellows Falls, Vt.: Dairy appliances.
- Wickson, G. G., & Co., San Francisco, Cal.: Dairy appliances.
- Wilder Manufacturing Company, Springfield, Mass.: Electrical temperature indicator.
- Williams, Thomas, Brooklyn, N. Y.: Felt jackets for milk cans.

CLASS 38.—*Theory of agriculture—Agricultural statistics.*

- Agricultural Experiment Station of Alabama, Auburn, Ala.: Experiments on improvement of varieties of cotton. Monograph on cotton, photographs.
- Agricultural Experiment Station of Arizona, Tucson, Ariz.: Charts showing influence of winter irrigation on movement of ground water. Photographs.
- Agricultural Experiment Station of Arkansas, Fayetteville, Ark.: Photographs. Fertilizer experiments with wheat.
- Agricultural Experiment Station of California, Berkeley, Cal.: Typical soils, soil map, soil analysis, photographs and reports.
- Agricultural Experiment Station of Colorado, Fort Collins, Colo.: Photographs.
- Agricultural Experiment Station of Connecticut, New Haven, Conn.: Collection of vegetable proteids, separated from various seeds. Photographs.
- Agricultural Experiment Station of Delaware, Newark, Del.: Photographs.
- Agricultural Experiment Station of Florida, Lake City, Fla.: Photographs. Experiments with pineapples, etc.
- Agricultural Experiment Station of Idaho, Moscow, Idaho: Photographs.
- Agricultural Experiment Station of Illinois, Urbana, Ill.: Photographs.
- Agricultural Experiment Station of Indiana, Lafayette, Ind.: Plant centrifuge. Photographs.
- Agricultural Experiment Station of Iowa, Ames, Iowa: Photographs, models of fruits, vegetables, and meats.
- Agricultural Experiment Station of Kansas, Manhattan, Kans.: Models of meat showing effect of breed and feeding. Photographs.
- Agricultural Experiment Station of Kentucky, Lexington, Ky.: Charts showing effects of fertilizers. Photographs.
- Agricultural Experiment Station of Maine, Orono, Me.: Photographs.
- Agricultural Experiment Station of Maryland, College Park, Md.: Photographs.
- Agricultural Experiment Station of Minnesota, St. Anthony Park, Minn.: Photographs, charts, samples of crossbred wheat.
- Agricultural Experiment Station of Mississippi, Agricultural College, Miss.: Photographs.
- Agricultural Experiment Station of Missouri, Columbia, Mo.: Sheep charts showing crossing experiments. Photographs.

- Agricultural Experiment Station of Montana, Bozeman, Mont.: Photographs.
- Agricultural Experiment Station of Nebraska, Lincoln, Nebr.: Photographs.
- Agricultural Experiment Station of New Hampshire, Durham, N. H.: Photographs.
- Agricultural Experiment Station of New Jersey, New Brunswick, N. J.: Monograph on plant diseases; 20 mounted specimens. Photographs.
- Agricultural Experiment Station of New Mexico, Mesilla Park, N. Mex.: Photographs, cereal exhibits.
- Agricultural Experiment Station of New York, Geneva, N. Y.: Charts, sources of milk fat, coefficients of digestibility of American food stuffs. Photographs.
- Agricultural Experiment Station of North Carolina, Raleigh, N. C.: Photographs.
- Agricultural Experiment Station of North Dakota, Agricultural College, N. Dak.: Root cages showing distribution of grain and grasses in soils. Photographs.
- Agricultural Experiment Station of Ohio, Wooster, Ohio: Monograph on plant diseases. Charts, photographs.
- Agricultural Experiment Station of Oklahoma, Stillwater, Okla.: Photographs, tests of orchards and of irrigation on forest trees; feeding experiments.
- Agricultural Experiment Station of Pennsylvania, State College, Pa.: Bulletin on metabolism; experiments on steers to determine maintenance rations. Photographs.
- Agricultural Experiment Station, Reno, Nev.: Photographs.
- Agricultural Experiment Station of Rhode Island, Kingston, R. I.: Photographs; experiments in crossing geese; effects of lime on clover; etc.
- Agricultural Experiment Station of South Carolina, Clemson College, S. C.: Photographs.
- Agricultural Experiment Station of South Dakota, Brookings, S. Dak.: Photographs.
- Agricultural Experiment Station (Storrs), Storrs, Conn.: Bacteria cultures useful or deleterious in dairying. Photographs.
- Agricultural Experiment Station of Tennessee, Knoxville, Tenn.: Photographs.
- Agricultural Experiment Station of Texas, College Station, Tex.: Photographs.
- Agricultural Experiment Station of Utah, Logan, Utah: Photographs.
- Agricultural Experiment Station of Vermont, Burlington, Vt.: Photographs, charts, monographs.
- Agricultural Experiment Station of Virginia, Blacksburg, Va.: Photographs, charts.
- Agricultural Experiment Station of Washington, Pullman, Wash.: Photographs, varieties of grasses.
- Agricultural Experiment Station of West Virginia, Morgantown, W. Va.: Photographs, monographs, auxanometer.
- Agricultural Experiment Station of Wisconsin, Madison, Wis.: Milk tests, meat models, charts, photographs.
- Agricultural Experiment Station of Wyoming, Laramie, Wyo.: Charts, photographs.
- Association of Agricultural Colleges and Experiment Stations: Collective exhibit of the work of experiment stations in the United States.
- Chamberlain Publishing Company, Orange, N. J.: Publications, Rackham's Poultry Directory.
- Department of Agriculture, United States, Bureau of Animal Industry, Washington, D. C.: Maps, charts, illustrating animal industries in the United States.
- Department of Agriculture, United States, Dairy Division, Bureau of Animal Industry, Washington, D. C.: Maps, diagrams, and charts illustrating dairy industries of the United States.
- Department of Agriculture, United States, Division of Soils, Washington, D. C.: Electrical apparatus for determining soil moistures, samples of soils.
- Department of Agriculture, United States, Office of Experiment Stations, Washington, D. C.: Publications, photographs, plans, drawings.

Department of Agriculture, United States, Weather Bureau, Washington, D. C.: Working weather station and observatory, showing the recording instruments in operation.

Experiment Station of Alaska, Sitka, Alaska: Agricultural products, photographs.

Experiment Station of Cornell University, Ithaca, N. Y.: Photographs, models.

Experiment Station of Georgia, Experiment, Ga.: Photographs.

Experiment Station of Hawaii, Honolulu, Hawaii: Lavas and rocks, natural mineral products, coffee, rice, sugar. Photographs.

Experiment Station of Louisiana, Baton Rouge, La.: Photographs.

Experiment Station (Sugar) of Louisiana, New Orleans, La.: Photographs.

Experiment Station (Hatch) of Massachusetts, Amherst, Mass.: Photographs, charts.

CLASS 39.—*Vegetable food products.*

Abbot, M. J., Urbana, Ohio: Wheat.

Abernathy, J. E., Ocellus, Tenn.: New York hard wheat, winter barley, winter rye, oats.

Abild, Hans, Lodi, S. Dak.: Indian corn.

Ackman & Tuftley, Los Angeles, Cal.: Olive oil.

Alaska Agricultural Experiment Station, Sitka, Alaska: Wheat and oats.

Agricultural Experiment Station (Hatch), Amherst, Mass.: Millet, soy beans, plants, seeds, and hay.

Agricultural Experiment Station of Kentucky, Lexington, Ky.: Collective exhibit of wheats.

Agricultural Experiment Station of Maryland, College Park, Md.: Wheats, corn, emmer.

Agricultural Experiment Station of New Mexico, Mesilla Park, N. Mex.: Grain, new varieties produced by Prof. A. E. Blount.

Agricultural Experiment Station of North Dakota, Agricultural College, N. Dak.: Barley, corn, buckwheat, oats, emmer, wheats.

Agricultural Experiment Station of Oregon, Corvallis, Oreg.: Collective exhibit of export cereals grown in Oregon.

Agricultural Experiment Station of Pennsylvania, State College, Pa.: Collective exhibit of wheats.

Agricultural Experiment Station of Washington, Pullman, Wash.: Collective exhibit of barley, oats, wheat.

Aiken, W., Fairforest, S. C.: Lowland swamp rice.

Allen, W. J., Watertown, Tenn.: Maize.

Aldredge, W., Hinckley, Utah: Alfalfa seed.

Altman, J., Cribbs, Pa.: Winter rye.

American Cereal Company, The, Chicago: Dairy stock and poultry foods.

Amsden, C. S., Millbank, S. Dak.: Barley, marble wheat, winter rye.

Anable, I. M., Naples, N. Y.: Clawson gold coin wheat, oats, barley, winter rye.

Anderson, P. jr., Moroni, Utah: Wheat.

Anderson, T. O., Abilene, Tex.: Corn, millet.

Andrews, F. G., Chinagrove, Miss.: Rice.

Apperson, R. W., Pisgah, Mo.: Maize.

Arizona Agricultural Experiment Station, Phoenix, Ariz.: Wheat.

Ashley, D. G., Ashley, Miss.: Oats, corn.

Atkinson, J. H., O'Fallon, Ill.: Fultz and Fulcaster wheat, black oats, corn.

Ayres, A., Lansing, Mich.: Corn.

Bagwell, N. E., Allensville, Ky.: Little Willis corn.

Bailey, M. M., Birdsall, Mich.: Rye, oats.

Baird, A., Greenville, Ohio: White oats

- Baker, G. G., Britton, Okla.: White kaffir corn, wheat, oats.
- Baker, W. W., Walla Walla, Wash.: Wheat.
- Baker, I. P., Bismarck, N. Dak.: Wheat.
- Baker, J. W., Kymulga, Ala.: Blue stem wheat, black rye.
- Baker, Theodore, Giltner, Nebr.; Silver white corn.
- Baldwin, A., Oberon, N. Dak.: German rust-proof oats.
- Barker, L. D., Pleasanthill, Nebr.: Black winter rye, white Swedish oats, corn.
- Barnes, E. F., Bloomington, Okla.: Early Dwarf, Yellow Paxton, Hickory King corn.
- Barnett, R. C., Lebanon, Kans.: Snowflake corn.
- Barson, P. S., Clarkston, Utah: New Zealand wheat, white oats.
- Barteldes & Co., Lawrence, Kans.: Collection of saccharine and nonsaccharine sorghums for forage.
- Bass, E. I., Watertown, Tenn.: Neal's white corn.
- Bass, J. A., Watertown, Tenn.: Burt oats.
- Baugh, J. W., Franklin, Tenn.: Rye, Burt oats, Fultz and Longberry wheat.
- Baxter, J. R., Spring City, Utah: Wheat.
- Beatty, H. C., Terra Alta, W. Va.: Buckwheat.
- Beck, W. H., Bluesprings, Nebr.: Turkey wheat.
- Beeson, H. H., Newmarket, N. C.: Blue rye, Fulcaster wheat.
- Bentley, H. L., Abilene, Tex.: Hay.
- Bell, E. P., Florence, Tenn.: Oats.
- Beneke, E., Brockfield, Wis.: Manchuria barley, German rye, oats, Fife spring wheat, yellow flint hard corn.
- Bennett & Millett Company, The, Gouverneur, N. Y.: Ground clover poultry food.
- Betzler, H., Appleton, N. Y.: Barley.
- Biggs, B. D., Shippensburg, Pa.: Wyandotte red wheat.
- Blackstock, J., Avoca, Tex.: Red oats.
- Blank, N. J., Pisgah, Mo.: Black oats.
- Blevins, J., Omega, Okla.: Maize.
- Batchford, E. W., & Co., Chicago: Calf, horse, and poultry foods.
- Block, H., St. Augusta, Minn.: Winter rye.
- Blume, I., Blume, La.: Black rye, wheats, improved yellow corn.
- Board of Trade, New Orleans, La.: Collective exhibit of rice.
- Boejmke, E., Remsen, Iowa: Clover, white and yellow corn.
- Bowers, A. G., Ennis, Mont.: Oats.
- Bowles, Rudder & Weber, Afton, Mo.: Corn, prehistoric and other varieties.
- Bradstreet, H. C., Clifton, Tex.: Gold chaff, Mediterranean wheat, winter rye, rust-proof oats, corn.
- Bradstreet, W. C., Clifton, Tex.: German millet.
- Brewer, J. F., Walla Walla, Wash.: Red chaff wheat in the straw.
- Brittain, W., Parkman, Wyo.: Alfalfa.
- Brown, A., Greenville, Va.: White and yellow dent corn.
- Brown, C. L., Cinnaminson, N. J.: Rye.
- Brown, J. J., Sprague, Wash.: "Pelouse blue stem," white winter wheat, blue barley, mammoth white oats.
- Brown, L., Clio, Mich.: Jones's Fife winter wheat, barley, silver hull buckwheat, rye, corn.
- Browning, J. A., Church Hill, Ky.: Fultz and Fulcaster wheat, Big Willie corn.
- Bruce, H. C., McPherson, Kans.: Golden Beauty corn.
- Brumbaugh, J. N., Manganville, Md.: Spade wheat.
- Bryan, J. L., Watertown, Tenn.: Bearded Fulcaster wheat.

- Buren, John J., Cullom, Ill.: Early yellow dent and Silver Mine maize, barley, white Hunt oats.
- Burgur, L. A., Tonica, Ill.: Maize and oats.
- Burgess, L. A., Tonica, Ill.: German millet.
- Burgeson, B. O., Aurora, Nebr.: Mammoth white corn.
- Burnett, J., Corvallis, Oreg.: Golden Chaff, Kinney, and white winter wheat.
- Burpee, W. Atlee, Philadelphia, Pa.: Forage and grass crops, photographs.
- Bybee, R. L., Leorin, Idaho: White Russian oats.
- Byers, N. S., Pendleton, Oreg.: Wheat.
- Calhoun, A. A., Millerburg, Ohio: Seisure oats.
- Caldwell, E. W., Scottsboro, Ala.: Mixed red and white cob, Ohio White corn.
- California Packing Company, San Francisco, Cal.: Olives and olive oil.
- California Paris Commission (San Francisco Produce Exchange), San Francisco, Cal. Collective exhibit of cereals for export.
- California Wharf House Company, Davisville, Cal.: Club wheat, barley.
- Carlock, W. J., Huntsville, Ark.: Bib white and Calico corn.
- Carneal, Thomas D., Livermore, Cal.: White admirable wheat.
- Carpenter, G. A., Watertown, S. Dak.: Wheat, maize, barley, oats, rye.
- Carrall, J. C., Ursula, Ark.: White corn.
- Carter, L. W., Highmore, S. Dak.: Millets and native grasses.
- Cartwright, M. T., County Line, N. Y.: Wheat.
- Chamberlain, E. E., Bluesprings, Nebr.: Maize.
- Chaffin, T. J., Chestnut Fork, Va.: Rust-proof winter oats.
- Chaney, J. C., Pittston, Va.: Blue-stem wheat.
- Chaney, J. R., Woodburn, Ky.: Winter oats, Currell's prolific wheat.
- Chavez, J. M. C., Abiquiu, N. Mex.: Wheat, oats, vallo beans, Chama Pelombrosa, native Indian, West Indian calico corn.
- Clark, D., Poplar City, Ill.: Maize.
- Clemons, L. W., Davenport, Iowa: Velvet blue-stem wheat, Iowa white-dent and Iowa golden-dent corn.
- Clevenger, C. E., Stevenson, Va.: Big White rye. White Western oats, Early Red Lyon, and Franklin Prolific wheat.
- Click, W. W., Elmwood, N. Dak.: Fulcaster wheat.
- Clore, L. B., Franklin, Ind.: Maize.
- Coins, J. N., Omega, Okla.: Late French millet.
- Colliver, R., Summers, Ark.: Iowa mixed dent corn.
- Colman, W. E., Broomfield, Colo.: Wheat.
- Commercial Club, Denton, Tex.: Blue-stem wheat, white corn.
- Commercial Club, Topeka, Kans., collective exhibit as follows:
- Griffith, H., Belle Plaine, Kans.: Maize.
- Hay, W. S., Menoken, Kans., Maize.
- Hitchcock, J. S., Manhattan, Kans., Maize.
- Hubbard, T. D., Kimball, Kans.: Maize.
- Miller, B., Topeka, Kans.: Maize.
- Rucker, W. G., Corning, Kans.: Maize.
- Conger Brothers, Mimosa, Tenn.: Fulcaster wheat, Huffman corn.
- Coontz, J. F., & Co., Vandalia, Mo.: Fultz wheat.
- Cooper, G. W., Corvallis, Oreg.: White winter wheat.
- Cooper, Ellwood, Santa Barbara, Cal.: Olive oil.
- Coppock, D. M., Pleasanthill, Ohio: Wheat, oats, barley, maize.
- Corbly, A. L., Springhill, Mont.: Oats.
- Corn exposition of Peoria, Ill.: Collective exhibit of Indian corn.

- Cotton, W. W., Portland, Oreg.: Wheat and oats in the straw.
- Courtright, J., Walnut, Ohio; Best Poole wheat, early yellow and Riber corn.
- Cousina, I. C., Erie, Mich.: Red Diehl wheat, oats.
- Coutts, D., Argyle, Minn.: Scotch Fife wheat.
- Cowan, R. T., Elmwood, N. C.: Improved Fultz wheat.
- Cox, C. A., Omega, Okla.: Barley.
- Cox, J. L., Missouri Valley, Iowa: Velvet Blue-stem wheat.
- Craighead, W. A., & Sons, Breckenridge, Tex.: Bald and Mediterranean wheat, black rye, corn, pop corn, White Kaffir corn.
- Craik, David, Oketo, Kans.: Millet, Turkey, Red Winter Fife wheat, oats.
- Cramsey, S., Conway, Kans.: Turkey wheat.
- Crandall, E., Walla Walla, Wash.: Blue-stem wheat in the straw.
- Crane, W. W., Tippecanoe City, Ohio.: Wheat, corn.
- Cranston, J. F., St. Cloud, Minn.: Velvet Blue-stem wheat, Nos. 1 and 2, white oats.
- Crawford, H. T., Belleville, Kans.: Maize.
- Crawford, W., Arcanum, Ohio: White bread corn.
- Creager, William H., Sumner, Iowa: Green Mountain oats in the straw, and oats.
- Creamer, E. L., jr., Frederick, Md.: Yellow Mastodon corn.
- Crenshaw, J. G., Knoblick, Ky.: Crenshaw's white wheat.
- Cress, C., Shippenburg, Pa.: Egyptian oats.
- Crosthwaite, C. W., Florence, Tenn.: Winter turf oats.
- Crothers, L. M., Crothers, Pa.: Duckbill barley, Gold Coin wheat, Golden Beauty corn.
- Culberson, C. H., Smyrna, Tenn.: Culberson's white corn.
- Cullimane, J., Denison, Tex.: Black oats.
- Currell, W. E., Gracepoint, Va.: Currell's Prolific wheat.
- Currie, S., Euclid, Minn.: Velvet blue-stem wheat.
- Dahl, A. P. R., Calera, Ala.: Red cob and white dent corn.
- Davis, A., Frederick, Md.: Longberry wheat, oats.
- Davis, J. A., Buxton, N. Dak.: Improved Velvet blue-stem wheat, white Russian oats, Manchuria barley.
- Dawes, J. M., Marshall, Mo.: Fultz wheat.
- Day, E. D., Lonestone, Pa.: Oats.
- De Land, C., Bluesprings, Nebr.: De Land's improved white corn.
- Denison Milling Company, Denison, Tex.: Mediterranean wheat.
- Department of Agriculture, Division of Agrostology, Washington, D. C.: Collective exhibit of food for animals, grasses and forage plants and utilization.
- Department of Agriculture, Division of Vegetable Physiology and Pathology, Washington, D. C.: Collective exhibit of new American varieties of export cereals.
- Dickerson, J. H., & Son, Burgin, Ky.: Red winter Fultz and Winter King wheat.
- Dickinson, The Albert, Company, Chicago: Collection of seeds of commercial importance in the United States and in the export trade.
- Diehl, E. F., Leesburg, Ind.: White rye in the straw, rye, Poole wheat.
- Doan, C. F., Doans, Tex.: Small golden millet, Haws corn.
- Dohm, C., Erie, Mich.: Side oats.
- Donaldson, C. S., Bowling Green, Ky.: Rust-proof oats.
- Dorsey, W., Whitehall, Va.: Maize.
- Doub, F., Keedysville, Md.: Red Warder wheat.
- Drew, C., Ardock, N. Dak.: White Russian oats, Manchuria barley.
- Duell, I. S., Woodstown, N. J.: Blue Stem wheat, corn.
- Duff, J. H. C., Fayetteville, Tenn.: White winter oats, winter bearded barley.
- East Washington Improvement Company, Lapwai, Idaho: Wheat.

Edge Brothers, Colusa, Cal.: Barley.

Eggart, W., Parkman, Wyo.: Silver-leaf oats.

Ekman & Stow, Oroville, Cal.: Olive oil.

Elliott & Burge, Corvallis, Oreg.: Wheat.

Emanuel, J. M., Wray, Colo.: Early yellow dent corn, wheat, Goose oats, millet, sorghum.

Emerson, S. F., Skowhegan, Me.: India buckwheat, white Russian oats.

Enestvedt, O. O., Belview, Minn.: Minnesota No. 163 wheat.

English, B. G., Manchester, Mich.: Rye, Johnson oats, Leaming corn, nigger wheat.

Ennis, John E., Narcoossee, Fla.: Hay.

Enoge, H., Loretta, S. Dak.: Emmer.

Everitt, J. A., Indianapolis, Ind.: Fultz Mediterranean wheat.

Experiment Station of North Dakota, Agricultural College, North Dakota: Wheat in the straw.

Experiment Station, Corvallis, Oreg.: Feise and Kinney wheat, black winter oats.

Fain, W. N., Nannie, Me.: Fulcaster wheat.

Faught, A. E., Sidney, Me.: Blue-stem wheat, two-rowed barley, white winter rye, early field oats.

Ferguson, W., Walla Walla, Wash.: Wheat and barley in the straw.

Field, J. C., Denison, Tex.: Corn.

Figard, J. W., Seward, Nebr.: Sea Island wheat, oats, Early White Prolific rye, Golden Dent corn.

Fitch, C. E., Alwilda, S. Dak.: Seed of cultivated forage crops.

Flowers, J. L., Colton, Wash.: Chevalier barley.

Foreman, J. B., Arcanum, Ohio: Budy and white Fultz wheat.

Foreman, N., Arcanum, Ohio: Wheat.

Fox, T., Harrisonville, N. J.: Fulcaster wheat.

Frankhouser, D. C., Fawcettgap, Va.: Fultz wheat.

Frazier, R. A., Dayton, Wyo.: Squaw and flint corn.

Freeman, W., Alpine, Ala.: Early Lay wheat.

Fretwell, C. W., Parkfield, Cal.: Wheat.

Gambill, T. H., Tusculumbia, Ala.: Bearded purple-straw wheat.

Gammill, L. C., Subrosa, Ark.: Harvest king wheat, hickory king and Valentine mammoth corn.

Gerrish, F. L., Boscawen, N. H.: White wonder oats, Walker corn.

Giddings, F., Ayr, Nebr.: White Russian oats.

Gidley, J., Sand Creek, Nebr.: Maize.

Gilmore, W. H., Fairlee, Vt.: Maize, oats.

Gillingham, G. L., Moorestown, N. J.: White and black mixed oats, winter Fife wheat, Japanese buckwheat, corn.

Gilkey, W. T., Dayton, Oreg.: White winter oats, white spring barley, and varieties of wheat, winter alsike.

Gilkey, W. T., Watsonville, Cal.: Grand Norway oats, Canada, Chevalier, and Chili barley, corn.

Glass, A., Omega, Okla.: Wheat.

Glucose Sugar Refining Company, Chicago: Gluten food for cattle and cornmeal.

Gluyas, W. R., Hofflund, N. Dak.: Seed of smooth brome grass (*Bromus inermis*).

Goodall, O. P., Lagrande, Oreg.: Winter wheats and winter barley.

Goodell, C. J., Morocco, Ind.: Barley, oats.

Grandin, J. L. & E. B., Mayville, N. Dak.: White Russian oats, wheat.

Greene, R., and Sutton, George, Manchester, Mich.: Red Clawson wheat.

Green, I. W., East Avon, N. Y.: Wheat.

Griffin, G. M., Brighton, Colo.: Defiance wheat.

- Grim, D. A., Colfax, Wash.: Wheat.
- Grim, J. J., Aurora, Nebr.: Whiteside oats.
- Grotelmoche, H., Columbus, Nebr.: Turkey wheat.
- Guydel, H. W., Princeton, Ill.: Little white oats.
- Hade, J. P., Greencastle, Pa.: Spade wheat, peerless rye, wonder oats, winter barley, Golden Dent corn.
- Hager, G., Colusa, Cal.: California wheat.
- Haines, J. J., Cribbs, Pa.: Longberry wheat, spring barley, American banner oats.
- Hammond, E. E., Olathe, Colo.: Defiance wheat, white Russian oats.
- Hancock, W. H., Shullsburg, Wis.: Peerless barley, winter rye.
- Hardeman, T., Davisboro, Ga.: Bearded rust-proof oats, red-cob corn.
- Hargett, S., Frederick, Md.: Barley, buckwheat.
- Harmon, E. R., Clifton, N. Y.: No. 6 Mediterranean wheat, German four-rowed barley.
- Harris, C. G., Marsh, N. C.: Fultz wheat, white gourd seed corn.
- Hawkins, B. C., Highlands, N. C.: Corn.
- Hawley & Moody, Oasis, Mich.: Alfalfa or lucern seed.
- Haynes Brothers, Emporia, Kans.: Corn.
- Hays, J. B., Matson, Mo.: Black oats.
- Hays, J. C., Versailles, Ky.: Fultz wheat.
- Heater, C. W., Middletown, Va.: Wheat, spring oats, barley, mammoth white corn.
- Heideman, W. H., Kalispell, Mont.: Rape seed.
- Hellbaum, F., Latah, Wash.: Wheat, barley, oats.
- Helzinger, G., Perkins, S. Dak.: Wheat.
- Hesla, E. S., Westerville, S. Dak.: Silver mine corn.
- Hickman, Prof. J., Freemont, Wooster, Ohio: Forage and grass crops. Photographs.
- Hickman, J. F., East Liverpool, Ohio: Oats.
- Hill, Charles L., Rosendale, Wis.: White Fife wheat, white cap corn.
- Hill, E. C., Anson, Tex.: Dhouira corn.
- Hill, H. P., Kersey, Colo.: Australian defiance wheat, white Russian oats.
- Hill, John, Elgin, Oreg.: Silver chaff white winter wheat.
- Hoag, Jay, Adrian, Mich.: Gold Coin wheat.
- Hodgin, E. N., Guilford College, N. C.: Fulcaster wheat, strawberry and white Flint corn.
- Hoff, G. M., Biggs, Ill.: Maize.
- Holms, William S., Marshall, Mo.: Texas red rust-proof oats, golden beauty corn.
- Hood, W. M., Laporte, Ind.: Buckwheat.
- Hoover, C. C., Hagerstown, Md.: Mortgage lifter oats.
- Hopkins, Prof. A. D., Morgantown, W. Va.: Timothy.
- Hopkins, J. T., Butteville, Oreg.: Wheat in the straw.
- Horsley, W. B., Rogers, Ark.: Fulcaster wheat, rust-proof and early white oats, Strawberry and Willie white corn.
- Houx, Mrs. E. M., Colusa, Cal.: California club wheat.
- Howard, Hiram, Marshall, Mo.: Pride of Saline and Uncle Sam's corn.
- Hoyt, J. K., Luther, N. C.: Fulcaster wheat, winter oats, Japanese buckwheat, Morgan white corn.
- Hoyt, G. W., Millbank, S. Dak.: White Russian oats.
- Huff, B. F., Denison, Iowa: White Russian oats, Sayler's Marvel spring wheat, Yellow Dent corn.
- Hug, H., Elgin, Oreg.: Chili club and Canada club mixed wheat.
- Huggins, J. H., Carrollton, Tex.: Silver chaff wheat, rust-proof and white-spring oats, Blue Jane and Strawberry corn.
- Huggins, W. A., Cave City, Ky.: Silver and Everett's red corn, Fulcaster wheat.

- Hughes, M. O., Bowling Green, Ky.: Fulcaster wheat.
- Hurt, J. H., Hollywood, Ala.: Mediterranean wheat.
- Hutton, W. H., Monticello, Ind.: Wheat, maize.
- Illinois State Grain Inspection, Chicago: Wheat, oats, barley, rye, corn, of commercial grades.
- Imboden, H., Wichita, Kans.: Turkey wheat.
- International Food Company, Minneapolis, Minn.: Foods for cattle.
- Jackson, T. W., Prairie Point, Miss.: Corn, peanuts.
- Jacobson, L. A., Hope, N. Dak.: Spring rye.
- Jacoby, Peter, Aurora, Nebr.: Corn.
- Jennings, Mrs. S., Mayview, Mo.: Pride of Lafayette rye.
- Jewell Nursery Company, Lake City, Minn.: Silver white oats.
- Johns, W., Thatcher, Ariz.: Australian wheat.
- Johnson, D. B., Mooresville, Ind.: Michigan amber wheat.
- Johnson, D. F., Horeb, Va.: Fultz wheat.
- Jolly, William, Corvallis, Oreg.: Little Club wheat, white Russian oats.
- Jones, A. N., Newark, N. Y.: Wheat heads, thrashed grain.
- Jones, J. J., Broomfield, Colo.: Wheat.
- Kaufman, J. C., Dauberville, Pa.: China wheat, white rye.
- Kearcher, L. M., Millbank, S. Dak.: Velvet blue-stem wheat.
- Keefe, D. G., Maine, Minn.: Blue-stem wheat, Lincoln and white Russian oats, Minnesota corn.
- Keeny, J. W., Erie, Mich.: Corn.
- Kenney, S. H., & Son, Morristown, Minn.: Minnesota early amber sugar cane.
- Kentucky Agricultural Experiment Station, Lexington, Ky.: Wheat.
- Kerr, G. G., Newark, Del.; Deitz, Longberry, and Fulcaster wheat, Golden Dent corn, grass seed.
- Kiger, R. C., Corvallis, Oreg.: Wheat in straw.
- Kilborne, F. L., Kelloggsville, N. Y.: Wheat, white oats, barley, corn.
- Kilen, A. R., Brownsburg, Minn.: Barley, Velvet blue-stem wheat, oats, corn, timothy.
- Killen, J. S., Minden, La.: Red rust-proof oats, corn, fescue grass.
- Killian, G. H., Concho, Ariz.: Wheat.
- Kjar, J. C., Manti, Utah: Oats.
- Klein Bros., Cameron, Mo.: Wheat.
- Kohler, John, Morrisonville, Mo.: Commercial red clover.
- Kohler, W. A. Leesburg, Ind.: Buckwheat.
- Kohn, J. J., Walla Walla, Wash.: Barley.
- Koiner, W. F., Ladd, Va.: Early yellow corn.
- Koser, D. C., Shippensburg, Pa.: Mediterranean wheat.
- Kramer, G., Strausstown, Pa.: White barley.
- Lake Shore and Michigan Southern Railway Company, Toledo, Ohio.: Winter wheat of commercial grades.
- Lamb, A. H., Oak Center, Minn.: Manchuria barley.
- Lambie, W., Mayview, Wash.: Palouse blue-stem, Little club wheat, barley.
- Lampton, A. P., China Grove, Miss.: Oats, corn.
- Landis, J. M., Marlow, W. Va.: Red-chaff wheat, beardless barley.
- Lang, Jacob, Hope, N. Dak.: Broom corn.
- Larimore, J. J., Hope, N. Dak.: Oats.
- Larson, L. A., Lincoln, S. Dak.: Barley.
- Laison, L. M., Millville, Utah.: Wheat.
- Later, P., Harrisville, Utah.: Taos wheat, corn.
- Lawrence, D. G., Burnett Junction, Wis.: Child's golden superb corn.
- Leaming, P. S., Wilmington, Ohio.: Maize.

- Leckenby, A. B., Portland, Oreg.: Collection of Northwestern forage crops and grasses.
- Lehnert, G. A., Tuscumbia, Ala.: Longhead bearded barley.
- Lenz, Henry, Tuscumbia, Ala.: Miller rye, wheat, corn.
- Lewis, J. N., Lima, Ark.: Red-bearded wheat, corn, oats.
- Lewis, O. K., Arlington, Nebr.: Velvet-chaff wheat.
- Liddell, J., West Somerset, N. Y.: Wheat.
- Livingston, M. W., Town, Ga.: Rice.
- Loseke, G., Columbus, Ohio: White Russian oats.
- Louden, W., Maine Prairie, Minn.: Corn.
- Lowman, W. M., Hastings, Nebr.: Mammoth white corn.
- Lowry, J. G., Cartersville, Ga.: Fulcaster wheat, Gourd Seed corn, California winter oats, Georgia rye.
- Lyon, W. E., Appleton, N. Y.: Buckwheat.
- Lytle, J. W., Alicel, Oreg.: Wheat.
- McAllister, J. W., Lagrange, Oreg.: Forty-fold wheat.
- McBeth, J., Monticello, Ind.: Wheat, maize.
- McCardells, A. C., Frederick, Md.: McCardell's ruddy wheat, corn.
- McClendon, R. T., Lisbon, La.: Corn.
- McCloud, J. A., Lowell, Ark.: Everett wheat.
- McCutchen, W. W., Scottsboro, Ala.: Broughton wheat.
- McDonald, M., Appleton, N. Y.: Oats.
- McGregor, J. D., Murfreesboro, Tenn.: Wheat.
- McHenry, O., Modesto, Cal.: Golden gate club and white Australian wheat, black rye, white Dent corn.
- McNeal, J. M., McRae, Ga.: German millet.
- McNear, G. W., San Francisco, Cal.: Wheat.
- Magic Food Company, St. Louis, Mo.: Stock and poultry foods.
- Manard, F., jr., Jackson, Mich.: Wheat.
- Manget, John A., Marietta, Ga.: Forage crops.
- Mann, J., Watsonville, Cal.: Wheat.
- March, John A., Shullsburg, Wis.: Corn.
- Marcks, A., Lexington, Mo.: Mediterranean wheat, black Texas oats, Charles white corn.
- Mariner, F. C., Northville, S. Dak.: Mediterranean Fife and Scotch Fife wheat, winter rye.
- Markel, E., Monticello, Ill.: Pop corn.
- Markert, J. M., Parkman, Wyo.: White hull-less barley.
- Markham, R., Clear Lake, Minn.: Corn.
- Martin, E. J., Nannie, Ga.: Maryland Flint wheat.
- Martin, G. S., Lonoke, Tenn.: Wheat, maize.
- Martin, H. M., Masontown, W. Va.: Black Spanish, red rust-proof oats, red Russian wheat.
- Martin, T. B., Fairforest, S. C.: Dewey oats, purple-straw wheat.
- Maryland Agricultural Experiment Station, College Park, Md.: Wheat, maize, emmer.
- Mason, E. J., Centerville, Ga.: Purple-straw wheat, rye, oats, corn.
- Mason, J. C., Winchester, Va.: Maize.
- Matson, W. H., Matson, Mo.: Black rye, Eight-Rowed Matson yellow, and St. Charles white corn.
- Mathews, Owen, Allen, Tex.: Golden-chaff, Nicaragua wheat, oats, soft-grained stock corn.
- Matthews, W. R. H., Southport, Tenn.: Fultz wheat, Burt oats, Tennessee Dent corn.
- Maynard, E. A., Ennis, Mont.: Barley.

- Messenburg, F., St. Cloud, Minn.: White Russian oats.
- Metcalfe, J. N., Silver Hill, N. Mex.: Seeds, specimens, and hay of native grasses and forage plants.
- Meyer, F. W., Bonny, Tex.: Hay, hay seed.
- Miller, Adam, jr., Tonica, Ill.: Corn, White Banner oats.
- Miller, C., Sapulpa, Ind. T.: Poole wheat.
- Miller, C., Langdon, Mo.: Barley.
- Miller, C. D., Hodgenville, Ky.: Wheat.
- Miller, D., Great Bend, Kans.: Wheat.
- Mitchell, A. E., Clearwater, Minn.: Side oats.
- Moffet, F. L., Chillicothe, Kans.: Corn, millet, oats.
- Moffett, J. M., Boody, Ill.: Maize.
- Morningstar, P. H., Utica Mills, Md.: Long Derby wheat, White hominy corn.
- Morrin, J. & L., Erie, Mich.: Barley.
- Morris, J. F., Ireton, Iowa: Velvet blue-stem wheat, champion side oats, mansard barley, corn.
- Mudges, F. E., La Salle, Ill.: Corn.
- Mumma, A. L., Mechanicsburg, Ohio: Corn.
- Murphy, S. H., Caledonia, Minn.: Blue Peter pea.
- Myers, D. W., Lone Pine, Pa.: Wheat, maize.
- Nash, J. D., Chauncey, Ga.: Oats, rice.
- National Starch Manufacturing Company, The, New York: Corn oil, gluten food, gluten meal, corn cake, corn.
- Naylor, J. L., Moscow, Idaho: Red Russian, little club wheat, barley.
- Neal, D., Watertown, Tex.: Rye.
- Neal, U. W., Watertown, Tenn.: Rye, Fultz wheat.
- Neal, A. S., Conway, Kans.: Oats.
- Neely, F. L., Wayne, Nebr.: Fife wheat.
- Neff, John, Tuscumbia, Ala.: Corn.
- Nelson, Mr., Coleman, Tex.: German millet.
- Nelson, N., Colfax, Wash.: Barley, oats.
- Nelson, R. C., Woodbine, Tex.: Fulkerson Mediterranean wheat, oats, corn.
- Newell, A., Damascus, Oreg.: Wheat.
- New Mexico Agricultural Experiment Station, Mesilla Park, N. Mex.: Wheat.
- New Orleans Board of Trade, New Orleans, La., collective exhibit as follows:
 National Rice Milling Company, New Orleans, La.: Rice and rice screenings.
 Rickert, F., jr., New Orleans, La.: Rice (hulled).
- Newton, G. G., Corvallis, Oreg.: Gray oats.
- Nicodemus, C. A., Walkersville, Md.: Australian, Rocky Mountain wheat, barley, Golden Beauty corn.
- Niemoller, A. F., Stitt, Kans.: Red Texas oats.
- Noyes, G. R., Beaver Dam, Wis.: Russian Fife wheat.
- Oakley, E. P., Rogers, Ark.: Wheat.
- Oelrich, Herman, Columbus, Nebr.: Corn.
- Oelrich, Herman, & Bros., Columbus, Nebr.: Early Oldenburgs oats.
- Oregon Agricultural Experiment Station, Corvallis, Oreg.: Collective exhibit—
 Bohannon, W., Corvallis, Oreg., oats.
 Jolly, W., Corvallis, Oreg., wheat.
 Lewton, G. G., Corvallis, Oreg., oats.
 Oregon Experiment Station, Corvallis, Oreg., wheat and oats.
- Oregon Railroad and Navigation Company, Portland, Oreg.: Collective exhibit—
 Babcock, W. C., Prescott, Wash., wheat.
 Baker, H., Walla Walla, Wash., wheat.
 Bowles, J. H., Prescott, Wash., wheat.

Oregon Railroad and Navigation Company, Portland, Oreg., etc.—Continued.

- Colburn, P. E., Athena, Oreg., wheat.
- Cotton, W. W., Portland, Oreg., wheat.
- Cox, D. H., Valley Grove, Wash., wheat.
- Davies, T. G., Walla Walla, Wash., wheat.
- Davis, J. E., Moscow, Idaho, oats.
- Demans, O., Dixie, Wash., wheat.
- Eldridge, H. D., Dixie, Wash., wheat.
- Eusler, R., Moscow, Idaho, barley.
- Ferguson, D. G., Walla Walla, Wash., wheat.
- Field, F. R., Walla Walla, Wash., wheat.
- Blathers, B., Prescott, Wash., wheat.
- French, H. F., Moscow, Idaho, barley.
- French, H. T., Moscow, Idaho, wheat.
- Gilkerson, T., Walla Walla, Wash., barley, wheat.
- Gosseling, A., Moscow, Idaho, wheat.
- Hancock, T., Walla Walla, Wash., wheat.
- Harbert, J. W., Walla Walla, Wash., wheat.
- Harkins, G., Prescott, Wash., wheat.
- Harrison, J., Moscow, Idaho, wheat.
- Hoffman, H., Colfax, Wash., oats.
- Hollingsworth, H. S., Colfax, Wash., wheat.
- Hopkins, J. T., Butteville, Oreg., wheat.
- Howard, H. W., Colfax, Wash., wheat.
- Hucford, H. F., Colfax, Wash., wheat.
- Hunter, W., Moscow, Idaho, wheat.
- Kelly, D. J., Dixie, Wash., wheat.
- Kirkman, Mrs. W., Walla Walla, Wash., wheat.
- Koch, H., Denmark, Wash., wheat.
- Law, G. W., Colfax, Wash., wheat.
- McGahey, R., Walla Walla, Wash., barley.
- McKenzie, A., Moscow, Idaho, wheat.
- Matlock, T. B., Colfax, Wash., wheat.
- Minnick, J., Waitsburg, Wash., wheat.
- Minnick, W., Dixie, Wash., barley.
- Moore, M. C., Walla Walla, Wash., wheat.
- Myers, J. E., Walla Walla, Wash., wheat.
- Oregon Railroad and Navigation Company's experiment farm, Walla Walla, Wash., wheat, barley, oats.
- Patterson, N. A., Prescott, Wash., wheat.
- Radliff, C. L., Dixie, Wash., wheat.
- Reaser, P., Walla Walla, Wash., wheat.
- Reaser, W. P., Walla Walla, Wash., wheat.
- Rock, J., Diamond, Wash., wheat.
- Sams, N., Athena, Oreg., wheat.
- Scott, W. J., Walla Walla, Wash., wheat.
- Shields, M. J., Moscow, Idaho, wheat.
- Thomas, W. B., Walla Walla, Wash., wheat.
- Tongstreet, G. N., Moscow, Idaho, wheat.
- Utter, J., Prescott, Wash., wheat.
- Vincent, H., Prescott, Wash., wheat.
- Washington Agricultural Experiment Station, Pullman, Wash., wheat, oats, barley.
- Yenney, P., Walla Walla, Wash., wheat.

- Overstreet, J. R., Franklin, Ind.: Overstreet peerless, Overstreet wonder, Speckles wonder corn.
- Pacific Coast Elevator Company, Portland Oreg.: Wheat of commercial grades.
- Parke, W. U., Worthing, S. Dak.: German millet, Side, Northern Scotch white oats, corn.
- Parkinson, W. W., Pleasant Grove, Minn.: Blue stem wheat; red winter, early white barley; early white and New Zealand oats; corn.
- Parks, J. S., Pleasant Mounds, Minn.: Red Blaze corn.
- Pattison, A. S., Marengo, Mich.: Red Clawson, Dawson golden chaff, nigger wheat, white Russian oats.
- Patton, R. H., Watertown, Tenn.: Fultz wheat.
- Paugh, E., Ennis, Mont.: Australian club wheat.
- Pawlich, J., Crete, Nebr.: Turkey wheat.
- Payne, J. C., Rockville, Minn.: Corn.
- Peacock, A. L., Higginsville, Mo.: Red Fultz wheat.
- Pearce, T. M., Manor, Md.: Howards barley, buckwheat, white dent corn.
- Peddicord, John, Wichita, Kans.: Golden beauty corn.
- Peeler, I., Center, Miss.: Corn.
- Peoria Corn Exposition, Peoria, Ill.: Maize.
- Perry, William, Aurora, Nebr.: Corn.
- Peterson, W. C., Longshore, S. C.: Wheat, oats, corn.
- Phillips, J. M., & Son, Mercersburg, Pa.: Beardless barley, corn.
- Phillips, P. R., Huntsville, Ala.: Orange wheat.
- Phillips, W. R., Green Forest, Ark.: Early white oats, wild goose corn.
- Pierce, W., Lagrande, Oreg.: Wheat.
- Pillsbury-Washburn Flour Mills Company, Minneapolis, Minn.: Wheat, commercial grades.
- Pittman, D. W., Lewiston, Ill.: Fultz wheat, white oats, rye, corn.
- Plasterer, J. B., Shippensburg, Pa.: Ruddy wheat.
- Plattner, J., Scotland, S. Dak.: Corn.
- Porcher, W. D., Charleston, S. C.: Gold seed head, wheat seed head, rice.
- Porter, E. A., Bowling Green, Ky.: White runer corn.
- Poulson, P., Richfield, Utah: Black Spanish oats.
- Price, H. J., Delta, Colo.: Odessa wheat, white Russian oats.
- Ranons, Mrs. L. P., Millbank, S. Dak.: Hard Fife wheat.
- Ratliff, J. T., Richmond, Ind.: Rye in the straw.
- Ratliff, W. S., Richmond, Ind.: New Columbia wheat, oats.
- Ray, Andrews, & Co., Salt Lake, Utah: Alfalfa seed.
- Record, J. H., Decatur, Ill.: Clydesdale oats.
- Rediger, C., Aurora, Nebr.: Turkey wheat.
- Reeder, E., New Hope, Pa.: Wheat, oats, buckwheat, corn.
- Reeves, H. O., Huntsville, Ark.: Maize.
- Reichard, R., Arcanum, Ohio: Corn.
- Reichenbach, L. C., Apple Creek, Ohio: Wheat.
- Reith, J., jr., Davisville, Cal.: Barley.
- Rene, W. T., Neche, N. Dak.: Scotch barley, Scotch Fife wheat, white Russian squaw corn, oats.
- Renk, W. F., Sun Prairie, Wis.: Lincoln oats.
- Resh, S., Broad Fording, Md.: Black Tartarian and Green Mountain oats.
- Reynolds, E., Banksville, N. Y.: Bald Blue-stem bearded wheat, winter rye.
- Richardson & Co., Chicago.: Wheat, corn.
- Richardson, Thomas V., Phoenix, Md.: Johnson's yellow corn.
- Richmond, John F., Richmond, Ind.: Beggar weed hay.
- Richmond, O., Tyndall, S. Dak.: Oats, barley, Sure Crop corn.

- Rickard, E. T., Grinnell, Iowa: Corn.
- Rine, J. M., Wells, W. Va.: Red Clawson wheat, white Russian oats, early Dent corn.
- Roatcap, Mrs. B. A., Olathe, Colo.: Nebraska white oats, angel of midnight corn.
- Roatcap, D. S., Olathe, Colo.: Maize.
- Robbins, D. E., Payson, Ill.: Wheat.
- Roberts, Prof. I. P., Ithaca, N. Y.: Forage and grass crops. Photographs.
- Roberts, J., Iona, Mich.: Rye.
- Robertson, J. T., Florence, Tenn.: Selts Improved corn.
- Robinson, Alexander McK., Ada, Tex.: Velvet bean seed.
- Robinson, A. S., Pleasant Mounds, Minn.: Velvet blue-stem wheat.
- Robinson, C., Clear Lake, Minn.: Rye.
- Robinson, J., Pleasant Mounds, Minn.: Velvet blue-stem wheat, black winter rye.
- Roderick, G., Frederick, Md.: Fulcaster wheat.
- Rogers, G. W., Laporte, Ind.: Corn, rye, barley, oats.
- Rohilly, P. H., Lake City, Minn.: Barley.
- Root and Cain, Versailles, Ky.: Terry Fultz wheat.
- Ross, J. R., Doans, Tex.: Rose Prolific corn.
- Rowe, Frank, Shullsburg, Wis.: Snowflake corn.
- Ruppe, A., Pendleton, Oreg.: Blue-stem wheat, Cox red chaff, and Sonora wheat.
- Russell, D. B., Shippensburg, Pa.: Dietz wheat.
- St. German, N. C., Corvallis, Oreg.: Wheat in the straw.
- Salisbury, Mrs. Lydia, A., Blue Mound, Ill.: White squaw corn.
- Salzer, J. A., Seed Company, La Crosse, Wis.: Winter wheat.
- Sawyer, J. J., Alpine, Ala.: Purple-stem wheat, blue-stem wheat.
- Scarborough, J. K., Payson, Ill.: Fultz wheat, Northern white oats, Feeders Favorite white corn.
- Scheer, Frank, Arlington, Nebr.: White Pearl corn.
- Schiermier, W., Cappeltn, Mo.: Fultz wheat.
- Schindel, S. M., Hagerstown, Md.: New variety of Blue Ridge wheat, wheat in the straw.
- Schriber, H. F., Colfax, Wash.: Bonanza oats.
- Schuttler and Hotz, Chicago: White Dent corn.
- Scott, J., Plain City, Ohio: Fultz wheat, Michigan amber wheat straw.
- Scott and Magner, San Francisco, Cal.: Stock foods, meal, baled hay.
- Seaver Brothers, Colusa, Cal.: Corn.
- Seitz, J., Tiffin, Ohio: Fultz, Gold Coin wheat, Lentz & Seiples, Hybrid corn.
- Seville Packing Company, New York City: Olives, pimolas, olive oil.
- Shahan, I. T., Green Forest, Ark.: Maize.
- Shaw, E. L., West Hampden, Me.: Lost Nation wheat, White Hogan oats, large Canada corn.
- Sheldon, C. H., Minnewaukon, N. Dak.: Scotch Fife wheat.
- Shelley, G. E., Manor, Md.: Fultz wheat.
- Shelton, D. A., Rome, Ga.: Red rust-proof oats.
- Shepard, Prof. James H., Brookings, S. Dak.: Forage crops, photographs.
- Shepperson, Daniel W., Langdon, Mo.: Branching Dhoura corn, rye, oats.
- Shurfey, C. W., Nebraska City, Nebr.: Yellow Turkey wheat, Silver Mine white oats, Prolific White red cob, and other corn.
- Shoemaker, P. H., Freeport, Minn.: Big four oats.
- Shofner, L. M., Mulberry, Tenn.: Poole wheat.
- Shouse, S. H., Versailles, Ky.: Kentucky blue grass corn.
- Showalter, S. J., Ladd, Va.: Wheat, mixed Virginia milling.
- Shutts, W., Wichita, Kans.: White pearl corn.
- Siljan, C. H., Madison, Minn.: Golden giant oats.
- Silverberg, J., Owens Ferry, Ga.: Rice.

- Simpson, J. B., Dallas, Tex.: Nicaragua wheat.
- Simpson, J. B., and Gibbs, B., Dallas, Tex.: Nicaragua wheat.
- Simpson, J. E., Norfolk, Nebr.: Corn.
- Slade, C. C., Manor, Md.: Gold Berry red wheat.
- Smith, A. T., Lexington, Mo.: Fultz wheat.
- Smith, F., Brighton, Cal.: White Sonora wheat.
- Smith, G. A., Yankton, S. Dak.: Pease, timothy, Velvet blue-stem wheat, oats, corn, popcorn, barley.
- Smith, H. C., Fremont, Ohio: Poole Ruddy Valley wheat, Potato and Michigan Wonder oats, corn.
- Smith, J. O., Casselton, N. Dak.: Red Mediterranean wheat.
- Smith, Julius P., Livermore, Cal.: Olive oil.
- Smith, O., Sapulpa, Ind. T.: Fultz wheat.
- Smith, O. W., Spring Hill, Mont.: Wheat.
- Smith Brothers, Corvallis, Oreg.: Wheat.
- Smith, S. A., Blue Springs, Nebr.: Black rye, Side oats.
- Smith, W. D., Authon, Tex.: Early amber sorghum, wheat, oats, corn, Big German millet.
- Smurthwaite, A., Produce Company, Ogden, Utah: Alfalfa and timothy seed.
- Snowden, F., Ashton, Md.: Fultz wheat, rye, oats, corn.
- Sommerkamp, R. P., Kamp, Ala.: Upland rice.
- Southern Cotton Oil Company, Memphis, Tenn.: Cotton-seed products used as food.
- Southern Railway Company, Washington, D. C.: Collective exhibit, as follows:
- Endly, G. A., Chase City, Va., winter rye.
- Fort, J. P., Mount Airy, Ga., rye.
- Georgia Agricultural Experiment Station, Experiment Ga., oats.
- McAllister, S. A., Columbus, Ga., wheat.
- Walker, R. L., Graham, N. C., wheat.
- Walker, W. J., Somerset, Va., oats.
- Soverhill, S. G., Tiskilwa, Ill.: Early Swedish oats, barley, corn.
- Spencer, E. E., Edgar, N. C.: White winter oats.
- Spencer, James F., Riverbank, Cal.: Corn.
- Spore, Z. S., Halstead, Kans.: Maize.
- Sprague, H., Ionia, Mich.: Dawson's golden chaff wheat.
- Spratt's Patent, Limited, New York City: Prepared food for dogs, poultry, game.
- Sprawls, W. L., Burk Place, La.: Corn.
- Staples, L. O., St. Joseph, Minn.: Bearded spring barley.
- Steffen, A., Grundy Center, Iowa: Black early white oats, barley, rye.
- Stephen, W. F., Harrisonville, Mo.: Timothy.
- Stevens, T., Malad City, Idaho: Odessa Fall, Spring Sonora, White amber, white club spring wheat, potato, and white Side oats.
- Stewart, P. M., Woodstown, N. J.: Golden hominy corn.
- Stine, Fred., Walla Walla, Wash.: Little club wheat, straw.
- Stock, W. H., Kidder, Mo.: Wheat.
- Stokes, W. H., Watertown, S. Dak.: Maize, Velvet blue-stem wheat, oats.
- Stouffer, J., Hagerstown, Md.: Lancaster, Dietz, and red wonder wheat, Stauffen's yellow dent corn.
- Strom, H. H., Hillsboro, N. Dak.: Hayne's blue stem, Saskatchewan Fife wheat, Russian white oats.
- Stuart, J. A., Lyndhurst, Va.: Mixed Fultz and Fulcaster wheat, rye, corn.
- Stuckey, J. L., Wichita, Kans.: Big May wheat.
- Sullivan, J. E., Pilot Point, Tex.: Maize.
- Sutton, G., Manchester, Mich.: Cereals.
- Swanders, E. H., Wood, Ohio: Golden chaff wheat.

- Taft, Austin S., Weston, Ohio: Clover, barley, oats, wheat, corn.
- Talant, A. W., Cuba, Ga.: Corn.
- Talant, F. H., Cuba, Ga.: Turf oats, red fall wheat.
- Tallman, H. B., Tecumseh, Mich.: Ruddy wheat, silver hull buckwheat, corn.
- Taylor, A., Harrisonville, Mo.: Maize.
- Taylor, A., Solomon, Kans.: Maize.
- Taylor, N. H., Henderson, Colo.: Corn:
- Taylor, P. H., Harrisonville, Mo.: Texas oats, blue-stem wheat, clover, timothy, corn.
- Tegt, Mrs. E., Arlington, Nebr.: White Russian Side oats.
- Templeton, W. E., Ursula, Ark.: Fulcaster wheat.
- Tenney, S. A., Newport, N. H.: Mortgage Lifter oats, early Walpole corn.
- Thomas, Samuel, Marshall, Mo.: Mammoth white corn.
- Thorburn, J. M., & Co., New York City: Grain, ensilage, and fodder corn, corn.
- Towson, W. P., Hagerstown, Md.; Fultz wheat.
- Trumbull & Beebe, San Francisco, Cal.: Legumes, grass, clover, and other seeds.
- Trump, W., Arcanum, Ohio: Oats.
- Tucker, E. F., Araby, Md.: Fulcaster wheat, golden beauty corn.
- Turner, G. W., Fair Forest, S. C.: Turf oats.
- Underwood, S. G., Council Bluffs, Iowa; White Russian oats, oats in the straw.
- Union Oil Company, 204 Carondelet street, New Orleans, La.: Cotton-seed cake, meal, hulls; cotton-seed cake, cotton-seed meal, bolted or unbolted; cotton-seed hulls for feeding and fertilizing.
- Vaden, J. H., Laurel Grove, Va.: Currell's prolific wheat.
- Van Slyke, Ionia, Mich.: Oats.
- Venable, A. R., Farmville, Va.: Bearded Fulcaster, Currell's prolific, Fultz wheat.
- Vine, Emory, Miles City, Mont.: Plants and seed of alfalfa, smooth brome and native grasses.
- Voorhees, Dr. E. B., New Brunswick, N. J.: Forage crops and methods of making ensilage. Photographs.
- Vorce, H., Muir, Mich.: Signal wheat.
- Vosbrink, George P., 69 South Water street, Chicago: Bird seeds, food for canary birds.
- Wade, T. B., Wales, Tenn.: Wheat.
- Wagner, W., Parkman, Wyo.: English Fife wheat.
- Waite, W. S., Wartrace, Tenn.: Peas, Fulcaster wheat, corn.
- Walden, W. A., Huntsville, Ark.: Wheat, oats.
- Waldron, C. A., Ionia, Mich.: Hathaway Dent corn.
- Walker, W. F., Aberdeen, Miss.: Maize.
- Walker, W. P., Griffin, Ga.: Red and purple straw wheat.
- Walters, J., La Salle, Mich.: Hybrid Mediterranean wheat.
- Walters, Moses, Trickham, Tex.: African and German millet, red top sorghum, wheat, oats, corn.
- Walton, I. N., Allensville, Ky.: Gill wheat, Improved Willis corn.
- Walton, J. W., Spring Hill, Mont.: Wheat.
- Warner, G. E., Clearwater, Minn.: Scotch Fife wheat.
- Warner, H. C., Forestburg, S. Dak.: Millets and native grasses, wheat, rye, Nepaul hull-less barley, oats, corn.
- Washington Agricultural Experiment Station, Pullman, Wash.: Wheat, oats, barley.
- Watson, D. A., Lebanon, Kans.: Golden gem corn.
- Weirick, G. S., Wichita, Kans.: Texas red oats.
- West Point Mill Company, Charlestown, S. C.: Rice, rice straw.
- Whatley, S. J., Nannie, Ga.: Turf oats, little red cob corn.
- Wheeler, T. C., Watertown, Tenn.: Corn.

- White, E. M., Hagerstown, Md.: Fulcaster, Fultz wheat.
- White, J. A., Hope, N. Dak.: Wheat, Velvet blue stem, Scotch Fife.
- Whiteley, John, Greenville, Ohio: Wheat.
- Whitsell, J. C., Elon College, N. C.: Kivit and Fulcaster wheat, Dexter winter rye, oats, Holt Wilhide corn.
- Whitney, Charles, Walla Walla, Wash.: White oats in the straw.
- Whitney-Noyes Seed Company, The, Buffalo, N. Y.: Collection of clover and other seeds cleansed by special process.
- Williams, A. E., Cameron, Mo.: Maize.
- Willson, J. R., Shortsville, N. Y.: Wheat.
- Wing, J. E., Mechanicsburg, Ohio: Beardless barley.
- Wingo, J. W., Montrose, S. C.: Boughton wheat, Baldwin white corn.
- Williams, Henry, Spring Ranch, Nebr.: Red club wheat.
- Williams, P. N., Salem, N. C.: Beardless Fulcaster wheat, rye, black spring oats, white corn.
- Wilson, James, Secretary of Agriculture, Washington, D. C.: Collective exhibit of manufactures from corn.
- Wilson, John A., Chestnut Park, Va.: Mammoth white corn.
- Wilson, J. H., Kenton, Tenn.: Little May wheat, Willis corn.
- Wolfrum, J. G., Bunceton, Mo.: White rye.
- Wood, T. W., & Sons, Richmond, Va.: Forage and grass crops, wheat, rye, barley, oats.
- Wright, E. H., Salem, Ind.: Improved Leaming corn.
- Wright, R., Summers, Ark.: Corn.
- Yates, J., Colusa, Cal.: White barley.
- Young, A. P., Lexington, Mo.: Rough and ready corn.
- Young, Rufus, Lexington, Mo.: Sugar corn.
- Yowell, P. J., Fremont, Kans.: Corn.
- Yunker, P. N., Lemitar, N. Mex.: Barley, wheat, oats, maize.
- Zeller, W. N., Shippensburg, Pa.: Mediterranean wheat.

CLASS 40.—*Animal food products.*

- American Condensed Milk Company, San Francisco, Cal.: Milk, condensed, evaporated.
- Armour & Co., Chicago: Butter, frozen eggs.
- Borden's Condensed Milk Company, New York City: Condensed milk, evaporated cream, condensed coffee; Gail Borden's Eagle brand condensed milk; Borden's Peerless brand evaporated cream; Borden's Eagle brand condensed coffee.
- Dairymen's Union, San Francisco, Cal.: Milk, cream, butter.
- De Land, A. D., Sheboygan, Wis.: Cheese.
- Department of Agriculture, United States, Dairy Division, Bureau of Animal Industry, Washington, D. C.: Collective exhibit of dairy products, milk, cream, butter, and cheese. Contributors:
- Briarcliff Farms, Briarcliff Manor, N. H., butter.
- Brush, Dr., New York, kumys.
- Candor, John R., Pittsford, Vt., butter.
- Casper, P. H., Nicholson, Wis., butter.
- Chandler & Rood Company, Cleveland, Ohio, butter.
- College Creamery, Ames, Iowa, butter.
- Dawley, F. E., Fayetteville, N. Y., butter.
- Elgin Creamery Company, Chicago, butter.
- Embich, Charles W., Lancaster, Ohio, butter.
- Farmers' Mutual Creamery, St. Johnsbury, Vt., butter.

Department of Agriculture, United States, Dairy Division, etc.—Continued.

Franklin, Mrs. W. A., Vernon, Vt., butter.
 Haggdahl, Samuel, New Sweden, Minn., butter.
 Hampton Cooperative Creamery, Easthampton, Mass., butter.
 Hermanson, Hans, Scandinavia, Wis., butter.
 Hoards' Creamery, Fort Atkinson, Wis., butter.
 Howard, J. F., Haverhill, Mass., butter.
 La Grange Creamery, Lagrange, Ga., butter.
 Lawrence, W. A., & Son, Chester, N. Y., butter.
 McLarens, A. F., & Co., Detroit, Mich., butter.
 Matzoon, Y. T., Company, New York, matzoon.
 Minnesota Dairy School, Columbus, Ohio, butter.
 Monadnock Farms, Monadnock, N. H., butter.
 Montague Creamery, Montague, Mass., butter.
 Norton, Edward, Goshen, Conn., butter.
 Ohio Dairy School, Rogersville, Ohio, butter.
 Reynolds, A. C., New York, butter.
 Rice, E. S., Triumph, Ohio, butter.
 Rice, H. W., Westford, Vt., butter.
 Root, C. P., Gilbertsville, N. Y., butter.
 Silver Lake Cooperative Creamery, Wisconsin, butter.
 Sondergaard, H. T., Litchfield, Minn., butter.
 Springbrook Creamery, Rockville, Conn., butter.
 Vernon Creamery, Rockville, Conn., butter.
 Wells River Creamery, Vermont, butter.
 Western Newark Creamery Company, Wisconsin, butter.
 Windsor Creamery Company, Windsor, Conn., butter.

Fairfield Dairy Company, The, Montclair, N. J.: Photographs; methods of supplying milk to cities.

Hall, W. A., Bellows Falls, Vt.: Collection of specimens of the by-products of dairying.

Harvey, Fred., Galt, Cal.: Milk, cream, butter, and cheese.

Helvetia Milk Condensing Company, Highland, Ill.: Highland brand cream, evaporated.

Lamont, G. Fred., St. Louis, Mo.: Eggs, crystallized, oil of eggs, egg food.

Maine Condensed Milk Company, Whitefield, N. H.: Condensed milk.

New York State commission to the Paris Exposition, Lowville, N. Y.: Butter, creamery, dairy and fancy; cheese, factory and fancy. Collective exhibit. Contributors:

Babcock, R. H., cheese.
 Baumbest, A. X., & Co., cheese.
 Bent, R. H., butter.
 Briarcliff Farms, butter.
 Cook, A. & H. E., cheese.
 Dawley, F. E., cheese.
 Dunaway, F. P., cheese.
 Goodrich, D. A., cheese.
 Hall, W. W., cheese.
 Meridale Company, butter.
 Norton, Robert, & Co., cheese.
 Rockdale Creamery, butter.
 Rosemary Creamery, butter.
 Underhill, Stephen, cheese.

Pacific Coast Condensed Milk Company, Seattle, Wash.: Milk, condensed.

Pacific Creameries, San Francisco, Cal.: Milk, cream, butter, and cheese.

Russell Cream Company, The, San Francisco, Cal.: Milk, cream, butter, and cheese.

- St. Charles Condensing Company, St. Charles, Ill.: Unsweetened and sterilized evaporated cream.
- St. Louis Dairy Company, St. Louis, Mo.: Photographs; methods of handling milk supply in a city.
- Simpson, McIntire & Co., Boston, Mass.: Butter, creamery.
- Swift & Co., Chicago, Ill.: Edible animal oils and fats.
- Vermont Condensed Milk Company, Richmond, Vt.: Milk, condensed.
- Walker-Gordon Laboratory Company, Boston, Mass.: Milk, modified; milk products.

CLASS 41.—*Inedible agricultural products.*

- Abney, Z., Prattville, Ala.: Dixon lint cotton.
- Adam's Cotton Company, Charleston, S. C.: Upland middling lint cotton.
- Addison, J. C., Ruddell, S. C.: Peterkin lint cotton and cotton seed.
- Adger, Joseph E., Hughes Spur: Short-staple cotton for hill land.
- Adkins, William, Auburn, Ala.: Truitt lint cotton.
- Advance Gin and Mill Company, Vicksburg, Miss.: Allen's hybrid cottons, "de-lint," and linters from seed after ginning.
- Agricultural Experiment Station of Alabama, Auburn, Ala.: King cotton seed.
- Agricultural Experiment Station of Georgia, Experiment, Ga.: Ten varieties of cotton.
- Agricultural Experiment Station of Mississippi, Agricultural College, Miss.: Cotton.
- Agricultural College of Oregon, Corvallis, Ore.: Shropshire and cotswold wool.
- Alexander, William D., Croft, N. C.: White cluster lint cotton.
- Alexander, J. F., Britton, Tex.: Mammoth seed storm-proof cotton.
- Allen, R. B., Midlothian, Tex.: Goose-egg cotton.
- Allison, S. B., New Orleans, La.: Ramie stalks and fiber prepared by Allison machine and process.
- American Cotton Oil Company, New York: Cotton-seed oils, cake, meal, linters, and soap.
- American Ginning Company, Philadelphia, Pa.: Sea-island cotton, ginned by Prior roller gin.
- Anderson, L. L., Roberta, Ind. T.: Storm-proof and green-seed cottons.
- Appetts', Williams, Sons, Hallettsville, Tex.: Cotton.
- Arnim, B. F., Hallettsville, Tex.: Meyer's lint cotton.
- Arthur, W. A., & Co., Texarkana, Tex.: Cottons.
- Ashford, W. R., Rockton, S. C.: King's lint cottons.
- Bailey, J. S., Raleigh, N. C.: Williams and Davis lint cottons.
- Baker, Sam., Woodson, Miss.: Girard lint cotton.
- Baker & Chapman, Rio Vista, Tex.: German variety of lint cotton.
- Bankinson, W. S., Yokena, Miss.: Allen Hybrid and China prolific cotton.
- Barbee, J. Y., Ripley, Tenn.: Cotton seed.
- Barper, William Gordon, Hemphill, Tex.: Cotton.
- Bates, R., Jackson, S. C.: Bates poor land and little brown cotton seed.
- Bates & White, Nassau, Iowa: Delaine wool.
- Battle, R. B., Raleigh, N. C.: Cotton.
- Battle, M. J., Whitakers, N. C.: Extra prolific improved lint cotton.
- Baxter, C. W., Hopedale, Ohio: Blacktop delaine merino wool.
- Bean, Tarleton H., Washington, D. C.: Alaska wool.
- Beck, W. S., Coleman, Tex.: Delaine merino wool.
- Bedell, E. I., Mound, Tex.: Bedell lint cotton.
- Bell, J. C., Renio, S. C.: Truitt lint cotton.
- Bell, W. W., Manley, Minn.: North Star wool.
- Bell & Moore, Red Bluff, Cal.: Three-fourths blood merino wool.
- Bendat, L., McComb City, Miss.: Upland long-staple cotton.
- Benton, S. M., Beaufort, S. C.: Sea-island lint and seed cotton.

- Berry, J. L., Hampton, Ga.: Berry early big boll lint cotton; branches of cotton covered with open bolls.
- Beyer, George, Poughkeepsie, N. Y.: National delaine wool.
- Biers, Rev. J. T., Round, S. C.: Peterkin lint cotton.
- Billings Farms, Woodstock, Vt.: Southdown wool.
- Binson, William E., Charleston, S. C.: Sea-island cotton.
- Bishop, M. A., Madison, Ala.: King lint cotton.
- Blakeney, J. C., Shawnee, Okla.: Ounce boll, sea-island, storm-proof lint cottons.
- Blanchard & Folsom, Mound, Tex.: Bedell's best lint cotton.
- Bogwell, Hardy B., Garner, N. C.: Cotton.
- Booth, J. B., Paris, Tex.: Bryant lint cotton.
- Bouchelles, E. F., Boligee, Ala.: Common Alabama cotton.
- Braden, B. T., Paris, Tex.: Cotton.
- Braden, C. C., Paris, Tex.: Cock's improved lint cotton.
- Braughton, Joseph T., Garner, N. C.: Cotton.
- Breazeale Bros., Bermuda, La.: Peterkin cotton.
- Breds, J. Ernest, Natchitoches, La.: Cotton.
- Brice, A. H., Woodward, S. C.: Peterkin improved lint cotton.
- Bryant, T. W., Midlothian, Tex.: Storm-proof cotton.
- Buttrill, Thomas H., Jackson, Ga.: Cotton.
- Byrd, A. G., Omega, Okla.: Nadagorish silk cotton seed; Petit Gulf seed.
- Byrd, M. T., Roxie, Miss.: Upland lint cotton.
- Calcots, Allen C., Ruston, La.: King cotton.
- Caldwell, L. H., Lumberton, N. C.: Big boll and common cottons.
- Callison, J. W., Greenwood, S. C.: Improved King lint cotton.
- Canty, John, Fort Mitchell, Ala.: King cotton seed.
- Caperton, W. P., Adona, Ark.: Big boll lint cotton.
- Capps, T. W., Geneva, Ala.: Truitts big boll lint cotton.
- Carpenter, John W., Batesville, Ohio: National delaine merino wool.
- Carter, J. J., Copeland, S. C.: Peterkin lint cotton seed.
- Cary, F. M., Seneca, S. C.: Peterkin lint cotton.
- Cary, Robert A., White Pond, S. C.: Peterkin cluster lint cotton.
- Casey, T. F., Oglesby, Tex.: Ounce boll lint cotton.
- Catheart, S. M., Rehoboth, Ala.: Catheart's improved cluster lint cotton.
- Chamber of Commerce, Los Angeles, Cal.: California cotton in the boll.
- Chandler, R. C., Stokes, Miss.: Rodger lint cotton.
- Chaplin, R. W., jr., Rantowles, S. C.: Cotton.
- Chapman, Max, Marysville, Ohio: Standard delaine merino wool.
- Chilton, J. B., Comanche, Tex.: Chilton blue seed improved lint cotton.
- Chinn, R. L., Coulterville, Tex.: Miles and king cotton seed.
- Chisholm, E. N., Rowesville, S. C.: Peterkin lint cotton.
- Clapp, A. R., Chatham, Ohio: Dickinson delaine merino wool.
- Clark, John G., Washington, Pa.: Improved Saxony wool.
- Clark, Judge Walter, Raleigh, N. C.: Drake's Cluster cotton seed.
- Clarke, William, Cahto, Cal.: Merino cross wool.
- Coates Brothers, Philadelphia, Pa.: Delaine wool.
- Cohn, S., & Son, Magnolia, Miss.: High-grade upland lint cotton.
- Colin, L. L., Carbon, Tex.: Berville and common cotton.
- Collins, W. A., Bastcop, La.: Peterkin cotton seed.
- Collins, W. E., Mayersville, Miss.: China prolific, Dougherty, long staple, Peterkin lint cottons.
- Commercial Museum, Philadelphia, Pa.: Washed and unwashed wool from various parts of the United States.

- Commonwealth Cotton Manufacturing Company, Durham, N. C.: Williams variety lint cotton.
- Cone, D. S., Red Bluff, Cal.: Merino wool.
- Conn, J. G., Neal, Tex.: Improved mixture lint cotton.
- Constant, Edward W., Atherton, La.: Willis cotton seed.
- Cook, W. A., Utica, Miss.: Cook's upland long-staple lint cotton.
- Corley, J. J., Florence, S. C.: Cotton plant in fruit; seed and lint cotton.
- Cossit, Dabis, Onondaga, N. Y.: American merino wool.
- Cribb, J. B., Manor, Ga.: Searsland cotton seed.
- Crow Brothers, Monroe, N. C.: King's Improved lint cotton.
- Culbertson, H. M., Sonora, Ohio: Dickinson's delaine merino wool.
- Currie, J. W., Rio Vista, Tex.: Storm-proof cotton.
- Curtis, W. S., Thomson, Ga.: Pruitts reimproved cotton.
- Davisson, F. M., West Manchester, Ohio: Oxforddown wool.
- Delta Cotton Company, Memphis, Tenn.: Cotton.
- Department of Agriculture, United States, Washington, D. C.: Collective exhibit of wools and goat fleeces.
- Department of Agriculture, United States, Museum Division, Washington, D. C.: Collective exhibit of flax, flax straw, Alaskan flax, and fibers.
- Department of Agriculture, United States, Museum, Vinita, Ind. T.: Fleece of Angora goat.
- Department of Agriculture, United States, Division of Statistics, Washington, D. C.: Collective exhibit of seed and lint cotton.
- Dewey, Gould & Co., Boston, Mass.: Graded Michigan wool.
- Dewstoe, Martin R., Mount Holly, N. C.: Improved King's cotton seed.
- Dill, Joseph T., Charleston, S. C.: Extra fine lint cotton.
- Dimler, William M., Fillmore, Ind.: Leicester-cross wool.
- Dockery & Donelson, Memphis, Tenn.: Lint cottons.
- Dodge, Charles Richards, Washington, D. C.: Photographs illustrating the fiber industry in the United States.
- Dorgan, L. C., Mobile, Ala.: Cotton.
- Dorgan, L. C., & Co., Mobile, Ala.: Common and Allen seed cotton.
- Draughn, Alonzo B., Ryan, Tex.: Stormproof lint cotton.
- Du Pre, A. H. & Son, McClellanville, S. C.: Sea-island and lint cotton.
- Eagleson, A. S., Washington, Pa.: Dorset horn wool.
- Easley, J. W., Pendeltonville, Tex.: Woolup seed cotton lint.
- Ellison, M. E., Williamston, S. C.: King's lint and seed cottons.
- Eubank, A. L., Armstrong, S. C.: Duncan's mammoth lint cottons.
- Evans, W. D., Cheraw, S. C.: Cotton.
- Ewing, Hon. R. T., Center, Ala.: Texas Stormproof lint cotton.
- Experiment Station of North Carolina, Raleigh, N. C.: King's No. 1 cotton seed.
- Fallin, W. H., Ruston, La.: Cotton.
- Farrell, T. W., Blackville, S. C.: Peterkin lint cotton.
- Farrill, P. W., Blackville, S. C.: Big Boll Prolific lint cotton.
- Ferguson, J. G., Vicksburg, Miss.: Ferguson's Prolific staple lint cotton.
- Ferrell, B. C., Quincy, Miss.: Common Mississippi lint cotton.
- Field & Strickland, Cartersville, Ga.: Common Georgia lint cotton.
- Finks, J. B., Waco, Tex.: Cotton.
- Fiske, Louis S., & Co., Philadelphia, Pa.: Wool, washed and unwashed, from various parts of the United States.
- Flint, Daniel, Sacramento, Cal.: Hops.
- Folts, A. J., Ripley, Tenn.: Green seed cotton seed.
- Forrest, James M., Paris, S. C.: Chester big boll lint cotton.

- Foster and Glassell, Shreveport, La.: Cotton.
- Frankinbush, J. M., New Orleans, La.: Lint cottons.
- Fripp, William P., Grahamville, S. C.: Sea-island cotton.
- Fugua, M. J., Anderson, Tex.: O'Brien big boll lint cotton.
- Gage, John P., Union, S. C.: Peterkin and Thomas hybridized cottons.
- Gallop, J. O., Woodson, Miss.: Timberlake lint cotton.
- Garland, B. W., Dekalb, Tex.: Cotton.
- Gilbert, J. E. & Co., Nashville, Tenn.: Cottons.
- Goodlett, James P., Memphis, Tenn.: Long staple, heavy bender, and upland lint cottons.
- Gordon, W. W., & Co., Savannah, Ga.: Commercial collection of East Florida and Georgia Sea Island cottons.
- Gracie, John M., New Gascony, Ark.: Black rattler, truitt, and silk osier lint cottons.
- Graham, A. T., Canton, Miss.: Pelican lint cotton.
- Graham, E. M., Ruston, La.: King cotton seed.
- Graham, W. A., Machpelah, N. C.: Graham's improved lint cotton.
- Green, B. A., Easley, S. C.: Allen's long staple, King's early cottons.
- Green, Mc., Altona, Okla.: Willow and red baltic cotton seed.
- Green, Wesley, Baxter, Ark.: Big-boll cotton seed.
- Greene, H. H., Ballettsville, Tenn.: Meyer's cotton.
- Gregory, W. B., Stovall, N. C.: Russell's lint cotton.
- Griffin, John, Greenville, Miss.: Griffin cotton.
- Guesnard, August, Lobdell, La.: Cotton lint.
- Gumbell, E., & Co., New Orleans, La.: Louisiana cottons.
- Guy, John N., Carbon, Tex.: Mir's variety lint cotton.
- Gwin, Davis & Gwin, Brunswick, Miss.: Extra staple lint cotton.
- Haile & Waltz, Chico, Cal.: Merino wool.
- Hale, Barry, Baxter, Ark.: Peterkin cotton seed.
- Hall, J. C., Ordway, S. Dak.: Shropshire wool.
- Halladay, C. L., Sebewa, Mich.: Rambouillet merino wool.
- Hallett, H. C., Morrillton, Ark.: Cook lint cotton.
- Halliday, W. P., Drewton, Ark.: Cotton.
- Hallowell, Donald & Co., Boston, Mass.: Wools, washed and unwashed, from various districts of the United States.
- Hancock, George A., Eugene, Oreg.: Fleece of Angora goat.
- Harden, W. A., Chester, S. C.: Peterkin lint cotton.
- Hardie, W. T., & Co., New Orleans, La.: Cotton.
- Hargrave, Joseph, Madrid, N. Y.: Dorset horn wool.
- Harmon, F. J., Lexington, S. C.: Peerless lint cotton.
- Harper, William G., Hemphill, Tex.: Texas cotton.
- Harrell, George R., Kelford, N. C.: Allen's long staple and hybrid cotton.
- Harris, George C., Mount Helena, Miss.: Cotton.
- Harris, John S., Oakley, Idaho: Fleece of Angora goat.
- Harris, Thomas, Thomas, Ga.: Cotton.
- Harris, W. P., Youngs, S. C.: Peterkin cotton.
- Harrison, John, Nash, Tex.: Stormproof and Peterkin lint cottons.
- Hart, J. S., Stono, S. C.: Seabrook lint cottons.
- Hartley, L. M., Salem, Iowa: Shropshire wool.
- Hawkins, B. W., Nona, Ga.: Prolific lint cotton.
- Hawkins, Henry, Shreveport, La.: Cottons and unpressed cotton lint.
- Hayes, H. M., Exlivin, Ga.: Cotton.
- Hays, X. D., Kent's Store, La.: Peterkin cotton seed.
- Hazlewood, J. D., Fayette Corner, Tenn.: Fine Pacific lint cotton.

- Heald, C. H., Healdton, Ind. T.: Ounce Boll and mixed cotton seed.
- Hecht, Liehmann & Co., Boston, Mass.: Wools of various breeds and grades.
- Hinson, W. G., Charleston, S. C.: Sea-island cotton.
- Holtz, Scott, Tiffin, Ohio: Dickinson Delaine wool
- Hooker, G., Eureka, Cal.: Merino wool.
- Horst Brothers, Horstville, Cal.: Hops.
- Huett, Lee, Baxter, Ark.: Peterkin cotton seed.
- Hughes, W. G., Hastings, Tex.: Merino wool.
- Indo-Egyptian Compress Company, New York and Boston: Cotton in bales.
- Jackson, E. B., Arnot, Miss.: Superior benders lint cotton.
- Jacob, A. R., Clinton, W. Va.: Saxony improved wool.
- Jagode, Philip & Co., Philadelphia, Pa.: Wool, Ohio washed, New Mexican unwashed fleece, New Mexican scoured.
- Jamison, John B., Maynard, S. C.: Jones and King's cottons.
- Jeter, W. W., Santuck, S. C.: Jeter Dickson cotton.
- Jeter, L. B., Santuck, S. C.: Peterkin cluster-lint cotton.
- Johnson, J. B., & Son, Canonsburg, Pa.: Wool.
- Johnson, J. M., Tallulah, N. C.: La Clede and long staple lint cotton.
- Johnston, C. W., Chapel Hill, N. C.: Boyd's prolific lint cotton.
- Jones, Hercules, Canton, Miss.: Jones's staple lint cotton.
- Jones, Horace, R., Arcadia, La.: Cotton lint.
- Jones, J. M., Summerville, Tenn.: Long staple lint cotton.
- Jones, J. Wiley, Banks, N. C.: Cotton.
- Joyner, N. C., Kingville, S. C.: Peterkin lint cotton.
- Justice, Bateman & Co., Philadelphia, Pa.: Merino, Shropshire, and crosses, washed and unwashed wool.
- Keener, M. M., Plaingrove, Pa.: Wool.
- Kelly, Thomas B., Kelly, Ala.: Hawkins improved cotton seed.
- King, J. B., St. Paul, S. C.: Peterkin lint cotton.
- King, J. M., Hattievile, Ark.: Cotton.
- Knoop, Frerichs & Co., Charleston, S. C.: Middling-fair lint cotton.
- Kohlmann, Louis, New Orleans, La.: Moss and vegetable hair for carriage upholstery.
- Koshland, M. S., San Francisco, Cal.: Merino wool.
- Kosminsky & McFaddin, Texarkana, Ark.: Cottons.
- Lea, F. H., New Orleans, La.: Commercially graded lint cottons.
- Lee, Robert E., Laurinburg, N. C.: Cotton.
- Lee, Samuel, & Co., Philadelphia, Pa.: Wool.
- Lenz, Henry, Leighton, Ala.: Green-seed lint cotton.
- Leonard, Daniel, Leonard, Iowa: Shropshire wool.
- Leslie, P. C., Norman, Okla.: Storm king cotton seed.
- Levi, M. P., Weaver, Tenn.: Levi's double boll lint cotton.
- Lipsecomb, A. S., Pacolet, S. C.: King lint cotton.
- Lipsecomb, B. S., Pacolet, S. C.: King lint cotton.
- Lipsecomb, J. M., Gowcher, S. C.: Big boll lint cotton.
- Logan, J. A., Gordon, Ala.: Storm-proof lint cotton.
- Lord, Mrs. Julia P., Salem, Oreg.: Flax straw and fiber produced by the Oregon Women's Flax Growing Association.
- Luce & Manning, Boston, Mass.: Graded wools.
- Ludwig, B. T. J., Mount Pleasant, N. C.: Green-seed mixed cotton.
- Lynch, B. McN., Laurinburg, N. C.: Cotton.
- Lynn, George W., Durham, N. C.: Williams's lint cotton.
- Lyons, J., Eureka, Cal.: California wools.
- Macarty, W. W., Choctaw, Okla.: Storm-proof cotton seed.
- McBride, John A., Scotland, N. C.: North Carolina cotton.

- McCord, J. W., Sabougla, Miss.: Russell's big boll and Colodyce's long staple cotton.
- McDonald, R., Trinity, Tex.: Bohemian and Peterkin lint cottons.
- McIntyre, Patsey, Glass, Miss.: Ferguson lint cotton.
- McKay, R. M., Cheraw, S. C.: Johnson mixed-seed cotton.
- McKinnon, A. J., Maxton, N. C.: King's early, Peterkin's improved, and other cottons.
- McKinnon, L. D., Laurinburg, N. C.: Simpson lint cotton.
- McLendon, J. R., Naftel, Ala.: Upland and big boll cotton seeds.
- McNary, James C., Washington, Pa.: Delaine merino wool.
- McNary, J. S., Canonsburg, Pa.: Delaine merino wool.
- Mahan, W. H., Randolph, Ala.: Cotton,
- Makeig, S. I., Ross, Tex.: Big boll cotton seed.
- Maloney, W. A., Kings Mountain, N. C.: Cotton.
- Martin, F. M., Pecangrove, Tex.: Bedell lint cotton.
- Maske, J. B., Polkton, N. C.: Dixie cotton seed.
- Massey, B. F., Fort Mill, S. C.: Peterkin lint cotton.
- Mauger & Avery, Boston, Mass.: Wool from the Eastern United States.
- Mauney, W. A., Long Shoals Cotton Mills, Long Shoals, N. C.: King's Improved lint cottons.
- Maxey, S. C., Choctaw, Okla.: Five lock cotton seed.
- May, W. H., Kings Landing, Ala.: Southern prolific lint cotton.
- Mial, Millard, Raleigh, N. C.: King lint cotton.
- Miller, C. W., Social Circle, Ga.: Big boll cotton.
- Miller, J. M., Upland, Ind.: Merino wool.
- Milton, R. K., Midlothian, Tex.: Goose egg five lock lint cotton.
- Minge, C. H., & Co., New Orleans, La.: Louisiana cotton lint.
- Mitchell, E. B., Ballettsville, Tex.: Meyers cotton.
- Mitchell, Joseph D., Newtown Landing: China prolific lint cotton.
- Mitchell, L. M., Heloise, Tenn.: Green-seed cotton seed.
- Mobile Cotton Exchange, Mobile, Ala.: Alabama cotton; upland and river lint cotton.
- Montgomery, George W., Tallulah, La.: Long staple cotton.
- Moore, Aaron, Canton, Miss.: Hawkins lint cotton.
- Moore, Dr. Matt., Warsaw, N. C.: Peerless lint cotton.
- Moore, T. B., Greensboro, Ga.: Simpson's cotton.
- Moore, W. E., Paris, Tex.: Bryant cotton.
- Morris, Thomas, Thomas, Ga.: Cotton.
- Moseley, Albert R., Salters Depot, S. C.: Peterkin lint cotton.
- Myers, E. L., Brock, Ind. T.: Ounce boll cotton seed.
- Neeley, A. L., Warren, S. C.: Truitt's improved lint cotton.
- Newcomber, J. L., Lamar, La.: Louisiana cotton lint.
- Nix, F. M., Bico, Tex.: Storm-proof lint cotton.
- Noland, B. R., Smithland, La.: Heavy Bender's lint cotton.
- Norfleet, F. S., Lecompte, La.: Allen long staple cotton.
- O'Brien, James F., Burnsville, Ala.: Eureka cotton seed.
- Ogilvie, Theodore, Minden, La.: Cotton.
- Oklahoma Cotton Compress Company, Oklahoma, Okla.: Cotton.
- Oliphint, T. W., Buntsville, Tex.: Jackson lintless cotton seed.
- Oliver, John L., Lancaster, Tex.: Green-seed, storm-proof, and Peterkin cottons.
- Orenbeck, Frederick, Baxter, Ark.: Peterkin cotton seed.
- Orr, J. W., Rio Vista, Tex.: Storm-proof lint cotton.
- Otto, John B., Tecumseh, Okla., Storm-proof lint cotton.
- Parker, John M., New Orleans, La.: Twelve varieties of lint cottons.
- Parker, John R., McCall, S. C.: Brown Texas Wood lint cotton.

- Patterson, R. A., Airlie, N. C.: Little white cotton seed.
- Payne, William R., & Co., New York City: Fleeces of Angora goat.
- Pearl, James, Port Gibson, Miss.: Alden's improved lint cotton.
- Peele, John B., Bloomington, Ohio: Dorset horn wool.
- Peteet, C., Madison, Ga.: Pilson's big boll and storm-proof cotton.
- Phillips, Charles C., Greenwood, La.: Dickin's short staple cotton.
- Pickett, H. A., Newberry, Fla.: Sea-island lint cotton.
- Pitts, B. B., & Son, Marshall, Tex.: Cotton.
- Plumb, Charles S., Fayette, Ind.: Cheviot wool.
- Pollock, W. A., Beird, Miss.: Griffin & Pollock's Fancy lint cotton.
- Porcher, Philip G., Mount Pleasant, S. C.: Cotton.
- Pordur, Philip G., Mount Pleasant, S. C.: Dullyard lint cotton.
- Prescott, E., Franklin, S. C.: Hawkins's lint cotton.
- Price, W. J., Jones, Okla.: Storm-proof cotton seed.
- Rhodes, A. S., Crawford, Ga.: Jackson's limbless cotton.
- Rice, C. S. O., Orysa, Tenn.: Green-seed cotton seed.
- Richards, John T., Pisgah, Ala.: Jackson's lint cotton.
- Richardson, J. C., Robertsville, S. C.: Tyler's limited cluster lint and seed cotton.
- Richardson, Washington, Baxter, Ark.: Peterkin cotton seed.
- Ridduck, N. E., Raleigh, N. C.: North Carolina cotton.
- Reigle, Philip A., Arlington, Ohio: Rambouillet wool.
- Right, L. W., Florence, S. C.: Peterkin's lint cotton.
- Rigsbee, Atlas M., Durham, N. C.: Williams's limbless cotton.
- Robe, J. W., Greencastle, Ind.: Leicester cross wool.
- Roberts, A. V., Mansfield, La.: Peterkin's long limb cotton seed.
- Roberts, J. W., Chandler Springs, Ala.: Long lint prolific cotton.
- Robertson, T. J., & Son, Hopedale, Ohio.: Delaine merino wool.
- Robinson, A., Benhams, La.: Peterkin's Long Limb cotton seed.
- Robinson, C. A., Rockton, S. C.: Jackson Limbless lint cotton.
- Roby, C. C., Rochefort, Mo.: Delaine wool.
- Rolty Company, Smeeds, Miss.: Bender's lint cotton.
- Rosenbergs Brothers, Ballettsville, Tex.: Myers' lint cotton.
- Russell, D. B., Morrilton, Ark.: Twenty-one varieties of lint cottons.
- Sanders, Capt. D. H., Greensboro, Ga.: Jones' improved lint cotton.
- Sanders, L., Alba, Tex.: Storm-proof lint cotton.
- Sanders, Orr & Co., Charlotte, N. C.: Cotton.
- Santa Cruz Island Company, San Francisco, Cal.: Three-quarters blood merino wool.
- Scott, Charles, Rosedale, Miss.: Cook's lint cottons.
- Scott, J. W., Wisacky, S. C.: Peterkin lint cotton.
- Scott, Lee R., Burgettstown, Pa.: Delaine merino wool.
- Scott, Richard, Milwaukee, Oreg.: Cotswold wool.
- Sebastian, W. W., Spring Ridge, La.: Cotton.
- Shaw, C. C., & Son, Newark, Ohio: Southdown wool.
- Sheldon, J. D., Fairplay, S. C.: Colis Peterkin and Sheldon's improved large boll cotton seed.
- Shine, John W., Pendletonville, Tex.: Dell's five lock lint cotton.
- Shipman, W. A., Auburn, Ala.: Texas ounce boll cotton lint.
- Sibley, R. C., Robeline, La.: Kimberley cotton.
- Simmes, S. S., Storeville, Ga.: Bush & Bayes prolific seed cotton.
- Simmons, William E., Lawrenceville, Ga.: Cotton.
- Singleton, W. L., Toddville, S. C.: Hawkins's prolific lint cotton.
- Slater, W. A., Durham, N. C.: Little king lint cotton.
- Slaton, J. P. & J. C., Tuskegee, Ala.: Christopher lint cotton.

- Sloan, J. B., & Co., Wilmington, N. C.: Cotton.
- Smith, Alfred, Oklahoma, Okla.: Storm-proof and Cheatham cotton seed.
- Smith, Charles D., Wathen, S. C.: King's Improved lint cotton.
- Smith, George T., Covington, Ga.: Deiring's small-seed cotton seed.
- Smith, John E., Farr, Tex.: Storm-proof lint cotton.
- Smith & Fullerton, Tecumseh, Okla.: Cotton.
- Snow, Clark, Oxford, Ala.: Russell lint cotton.
- Sommerkamp, R. P., Kamp, Ala.: Nankin lint cotton and seed.
- Southern Railway Company, The, Washington, D. C.: Models of plantation cotton compress, modern compress, wagon and car models.
- Sparkman, John H., Era, Tex.: Five Lock Storm-proof lint cotton.
- Spreckels, J. C., Warrenton, Tex.: Shoepack lint cotton.
- Spencer, George W., Chesterfield, S. C.: Jones's prolific big boll lint cotton.
- Spencer, T. C., Spencer, S. C.: King's Early lint cotton.
- Spicer, W. E., Bushnell, Ill.: Southdown wool.
- Sprunt, Alexander, & Son, Wilmington, N. C.: North Carolina upland lint cotton.
- Stallings, J. R., Morrillton, Ark.: Cotton.
- Stein, William, New Berlin, Tex.: Big boll and pelican lint cottons.
- Stevens, C. C., Crawford, Ga.: Gold leaf cotton.
- Stogner, John, Comanche, Tex.: Meyer's seed cotton.
- Stone, James A., & Son, Bradfordton, Ill.: Shropshire down wool.
- Stone, Nota B., Independence, Kans.: Big Dixie and excelsior cotton.
- Stone, R. J., Stonington, Ill.: Oxford down wool.
- Stuyvesant, Rutherford, Allamuchy, N. J.: Dorset horn wool.
- Sullivan, L. E., Pilot Point, Tex.: Cotton.
- Sullivan, Joseph W., Warthen, S. C.: Hawkins's lint cotton.
- Tarkington, S. G., Ballettsville, Tex.: Myers lint cotton.
- Taylor, B. L. L., Blevins, Tex.: Barwell & Woolup lint cotton.
- Thomas, William C., Gold Hill, Ala.: Cotton.
- Thompson, S. M., Prestonia, Mo.: White-seed lint cotton.
- Thompson, Z. T., Strong's Station, Miss.: Thompson's improved lint cotton.
- Tillman, E. D., Van Wyck, S. C.: Tillman's pet lint cotton.
- Tood, Albert M., Kalamazoo, Mich.: Plants, aromatic and medicinal; volatile oils.
- Tompkins, D. A., Charlotte, N. C.: Cotton.
- Tompkins, Josiah, & Son, Fostoria, Mich.: Lincoln wool.
- Traylor, T. W., White Oak, S. C.: Cotton.
- Tripp, Louis F., Grahamville, S. C.: Cotton.
- Tripp, William P., Grahamville, S. C.: Sea island cotton.
- Tullis, John W., & Co., Eufaula, Ala.: Cotton.
- Turner, William S., Banks, N. C.: Cotton.
- Tuttle, L. C., Eureka, Cal.: California wool.
- Van Valkenburgh, J. D., Greene, N. Y.: Rambouillet wool.
- Wadley, William O., Rogers, Ga.: Peterkin lint cotton.
- Waggoner, S. S., Ellenwood, Ga.: African limbless lint cotton.
- Walker, W. S., Jefferson, Tex.: Cotton.
- Walls, Sam, Ocee, Tex.: Storm-proof lint cotton.
- Warwick, J. M., Flourney, La.: Peterkin cotton.
- Watkins, J. F., Chappells, S. C.: Upland limbless cluster lint cotton.
- Watkins, Dr. W. W., Aberdeen, Miss.: Cotton.
- Watts, C. J., Ruston, La.: Peterkin and King cotton.
- Weaner, J. W., Heath Spring, S. C.: Russell's improved big roll cotton.
- Webb, W. T., Alpine, Ala.: King's Improved lint cotton.
- Wessinger, P. J., Boyleston, S. C.: Texas oak lint cotton.

Whitaker, F. A., Raleigh, N. C.: Cotton.
 Wilcox, S., Red Bluff, Cal.: Merino wool.
 Williams, J. M., Woodson, Miss.: King's improved lint cotton.
 Williams, W. B., Strongs, Miss.: Williams's best lint cotton.
 Williamson, J. A., Columbus, Ark.: Ocean and moon lint cotton.
 Williamson, J. J., Kickapoo, Okla.: Storm-proof lint cotton.
 Willingham, B. H., Thomson, Ga.: African limbless lint cotton.
 Wilson, C. C., Boyce, Tex.: Storm-proof cotton.
 Wilson, D. J., Lois, Tex.: Dan Wilson storm-proof five lock lint cotton.
 Wing, Joseph E., Mechanicsburg, Ohio: Dorset horn wool.
 Wingo, B. A., Inman, S. C.: Truitt lint cotton.
 Withers, J. B., Davidson, N. C.: King's improved lint cotton.
 Womack, T. A., Manchac, La.: Long staple lint cotton.
 Worthington, C. T., Leota, Miss.: Bender's weed cotton.
 Wright, Harrison, Omega, Okla.: Green Seed cotton seed.
 Wright, Simeon, Ruston, La.: Big boll lint cotton.
 Wright, W. H., Greensboro, Ga.: Peterkin cotton.
 Ziegler, Jacob, Clinton, Ill.: Shropshire down wool.

CLASS 42.—*Useful insects and their products—Injurious insects and plant diseases.*

Benton, Frank, Washington, D. C.: Queen-bee cages, specimens of bees, bulletins on beekeeping.
 Dadant, Chas., & Son, Hamilton, Ill.: Comb foundation.
 Department of Agriculture United States, Division of Entomology, Washington, D. C.:
 Collective entomological exhibit illustrating devices for the destruction of insects.
 Falconer, W. T., Manufacturing Company, Jamestown, N. Y.: Beehives and sectional honey boxes.
 Massachusetts State Board of Agriculture, Malden, Mass.: Models and photographs illustrating warfare against gypsy moths.
 Root, A. L., Company, Medina, Ohio: Beehives, beekeeping appliances, comb foundation, A B C book on bee culture, photographs of factory and apiary.

GROUP VIII.—HORTICULTURE AND ARBORICULTURE.

CHARLES RICHARDS DODGE, *Director*.

CLASS 43.—*Appliances and methods of horticulture and arboriculture.*

Albaugh-Georgia Orchard Company, Fort Valley, Ga.: Photographs of orchards and fruit shipping.
 Allen, S. L., & Co., Philadelphia, Pa.: Tools, agricultural and horticultural. Revolving globe.
 Audubon Park Association, New Orleans, La.: Photographs of landscape features, etc.
 Baron de Hirsch Agricultural Industrial School, Woodbine, N. J.: Photographs of orchards, gardens, etc.
 Bellefontaine Cemetery, St. Louis, Mo.: Photographs of landscape features.
 Burpee, W. Atlee, & Co., Philadelphia, Pa.: Photographs of growing crops.
 California Commission to Paris Exposition: Photographs of orchard and vineyard scenes in California.
 California Nursery Company, Niles, Cal.: Photographs of nursery and orchard scenes.
 Cemetery of Spring Grove, Cincinnati, Ohio: Photographs of landscape features.
 Coldwell Lawn Mower Company, Newburg, N. Y.: Lawn mowers.
 Conner, Washington E., New York City: Photographs of private grounds and vineyard.
 Cooper, Ellwood, Santa Barbara, Cal.: Photographs of olive orchards.

Division of Pomology, United States Department of Agriculture: Collection of photographs of horticultural organizations in the United States, containing the following:

National and district organizations:

American Association of Nurserymen. Photograph of association, Chicago, Ill., 1899.

American Pomological Society. Photograph of society, Philadelphia, Pa., 1899.

Northwest Fruit Growers' Association. Photograph of society, Tacoma, Wash., 1900.

Peninsula Horticultural Society. Photograph of society, Milford, Del., 1897.

State and local organizations—

Illinois State Horticultural Society: Officers and executive committee, 1899.

Kansas State Horticultural Society: Executive board, 1899.

Maryland State Horticultural Society: Officers, 1899.

Massachusetts Horticultural Society: Photographs of horticultural hall and library.

New Jersey State Horticultural Society: Photograph of society, 1899.

Ohio State Horticultural Society: Officers of executive board, 1899.

Rhode Island Horticultural Society: Photograph of society, 1896.

Rumford Historical Association: Photograph of monument to original apple tree, erected by society in 1895.

South Dakota State Horticultural Society: Officers, 1900.

Dintlemaun, L. F., Belleville, Ill.: Photographs of nursery and orchard scenes.

Dreer, Henry A., Philadelphia, Pa.: Photographs of aquatics.

Florida East Coast Hotel Company, St. Augustine, Fla.: Photographs of hotel grounds.

Graceland Cemetery, Chicago: Photographs of landscape features.

Griffing, Timothy M., Riverhead, N. Y.: Photographs of landscape features.

Hunnewell, H. H., 130 Beacon street, Boston, Mass.: Photographs of landscape features.

Johnson, F. C., Kishwaukee, Ill.: Photographs of farm cider and vinegar mill.

Lysle, Addison, Allegheny City, Pa.: Photographs of landscape features.

Maryland Agricultural Experiment Station, College Park, Md.: Photographs of horticultural scenes.

Michigan Seed Company, South Haven, Mich.: Photographs of fields of growing crops.

Milwaukee Park Commission, Milwaukee, Wis.: Photographs taken in Milwaukee parks.

National Cash Register Company, Dayton, Ohio: Photographs of horticultural features of grounds; homes of operatives.

Newby, Thomas T., Carthage, Ind.: Photographs, garden and orchard scenes.

Packard, A. S., Covert, Mich.: Photographs of orchard scenes.

Pennsylvania Railroad Company, Philadelphia, Pa.: Photographs of station grounds.

Postlethwaite, Harry, San Jose, Cal.: Photographs of nursery and orchard scenes.

St. Paul Board of Park Commissioners, St. Paul, Minn.: Photographs taken in parks.

Stevens, Mrs. Kinton, Montecito, Cal.: Photographs of tropical and sub-tropical plants.

Studer, Nicholas, Washington, D. C.: Photographs of ferns and decorative plants.

University of Idaho, Moscow, Idaho: Photographs of garden, nursery, and orchard scenes.

Vaughan, J. C., Chicago, Ill.: Photographs of growing crops and propagating houses.

Woodmere Cemetery, Detroit, Mich.: Photographs of landscape features.

CLASS 44.—(No exhibitors.)

CLASS 45.—*Fruit trees and fruits.*

- Addleman, Dill, Richmond, Ind.: Apples, 1899–1900.
 Aldrich, H. A., Neoga, Ind.: Apples, 1899–1900.
 Alsop, Mr., Argentine, Kans.: Apples, 1900.
 Alters, John, Belleplaine, Kans.: Apples, 1899.
 Ansley, M., Billsboro, N. Y.: Apples and pears, 1899–1900.
 Arlington Heights Fruit Company, Riverside, Cal.: Citrus fruits, 1899–1900.
 Ashlock, William, Turner, Kans.: Apples, 1900.
 Atherton, W. P., Hallowell, Me.: Apples, 1899.
 Axtell, F. H., Oakland, Me.: Apples, 1899.
 Babcock, E. F., Waitsburg, Wash.: Apples, 1899–1900.
 Baier, Phil M., Portersville, Cal.: Oranges, 1899–1900.
 Bailey, Frank, Wilson, Mo.: Apples, 1899.
 Bailey, Jacob, Green Mountain, N. C.: Apples, 1899.
 Bailey, J. W., Mountain Grove, Mo.: Apples, 1899.
 Baine, J. F., Lincoln, Ark.: Apples, 1900.
 Baker, G., Junius, N. Y.: Apples, 1899.
 Baldwin, M. A., Jacksonville, Ill.: Apples, 1899.
 Banner, Newton, Sugar Grove, N. C.: Apples, 1899.
 Barry, J., Redbluff, Cal.: Almonds, 1899.
 Bassett, W. A., Farmer, N. Y.: Apples, 1899.
 Bell, David K., West Brighton, N. Y.: Pears, 1900.
 Belle Louise Ranch, Manzanita, Cal.: Almonds, 1899.
 Benning, John, Lyons, N. Y.: Apples, 1900.
 Beer, S. J., Vandalia, Ill.: Apples, 1899.
 Berry Brothers, Turner, Kans.: Apples, 1900.
 Berry, M. F., Hallsville, Mo.: Apples, 1899.
 Black, William H., Floradale, Pa.: Apples, 1899.
 Barley, U. S., Redbluff, Cal.: Almonds, 1899.
 Blair, George A., Mulvane, Kans.: Apples, 1899.
 Blakely, L. M., Lyons, N. Y.: Apples, 1900.
 Blythe, Robert, Orrick, Mo.: Apples, 1900.
 Boggs, George A., Livingston, N. C.: Apples, 1899.
 Boss, Theodore, White Church, Mo.: Apples, 1899.
 Bradley, Benjamin, Lyons, N. Y.: Apples and pears, 1900.
 Bradley & Son, George H., Lakeroad, N. Y.: Apples, 1900.
 Bradley, J. Elmer, Lyons, N. Y.: Apples and pears, 1899–1900.
 Bradley, W. L., Leroy, N. Y.: Apples, 1899.
 Bream, Samuel, Floradale, Pa.: Apples, 1899.
 Bremer, Henry, Lyons, N. Y.: Apples, 1900.
 Bright, W. H., Richmond, Mo.: Apples, 1899.
 Brooks, W., Rhea, Ark.: Apples, 1900.
 Brown, Albert, Alquina, Ind.: Apples, 1899.
 Brown, A. N., Wyoming, Del.: Apples, 1900.
 Brown's Sons, Charles, Arroyo, W. Va.: Apples, 1899.
 Brown, M. F., Salem, Mo.: Apples, 1899.
 Brown, R. H., Arroyo, W. Va.: Apples, 1899.
 Bruner, T. K., Raleigh, N. C.: Apples, 1899.
 Bryant, A., & Son, Princeton, Ill.: Apples, 1899–1900.
 Burgdorf, S. E., Junius, N. Y.: Apples, 1899.
 Burk, Frank, Mesilla Park, N. Mex.: Apples, 1899.
 Burnett, Charles, Lyons, N. Y.: Apples, 1899.
 Burton, Geo. A., Orleans, Ind.: Apples and pears, 1899–1900.

- Cadwell, A., Valley City, Ill.: Apples, 1899.
- California Paris Exposition Commission, San Francisco, Cal.: Fruits and vegetables in preserving solution, citrus fruits and nuts, 1899-1900.
- Calvert, John R., Mayview, Mo.: Apples, 1900.
- Catron, J. T., Martinsburg, W. Va.: Apples, 1899.
- Chamberlain, D. S., Lyons, N. Y.: Apples, 1900.
- Chandler, John, Argentine, Kans.: Apples, 1900.
- Chase, Howard A., Mount Pocono, Pa.: Apples, 1900.
- Chipman, N. P., Redbluff, Cal.: Almonds, 1899.
- Christine, Mr., Argentine, Kans.: Apples, 1900.
- Clark, Merritt M., Bedford, N. Y.: Apples, 1899.
- Coffey, George W., Kelsey, N. C.: Apples, 1899.
- Coffey, Thomas A., Kelsey, N. C.: Apples, 1899.
- Colby, L., Argentine, Kans.: Apples, 1900.
- Collamer & Son, J. B., Hilton, N. Y.: Apples, 1900.
- Clohan, Alex., Martinsburg, W. Va.: Apples, 1899.
- Cone, D. S., Redbluff, Cal.: Almonds, 1899.
- Cone, M. H., Blowing Rock, N. C.: Apples, 1899.
- Connecticut State Pomological Society, J. H. Merriman, president, New Britain, Conn.: Apples, 1899.
- Cook & Son, H., Pavilion, N. Y.: Apples, 1899.
- Couglin, John, Argentine, Kans.: Apples, 1900.
- Cox, E. G., Bradrick, Ohio: Apples, 1900.
- Coyner, George A., Waynesboro, Va.: Apples, 1899.
- Crain, W. R., Villa Ridge, Ill.: Apples, 1899.
- Crozet Fruit Growers' Association, Crozet, Va.: Apples, 1899.
- Delmas, A. G., Scranton, Miss.: Pecans, 1899.
- Derby, S. H., Woodside, Del.: Apples and pears, 1900.
- Devore, P. L., Neoga, Ill.: Apples, 1900.
- Dickie, James, Massies Mill, Va.: Apples, 1899.
- Dintehmann, L. F., Belleville, Ill.: Apples, 1899.
- Division of Pomology, United States Department of Agriculture, Washington, D. C.: Grand collection of fresh fruits representing 18 States, crop of 1899, and 15 States, crop of 1900. Also 800 facsimile fruit models.
- Dorman, Walter, Billsboro, N. Y.: Apples, 1899.
- Dula, J. A., Lenoir, N. C.: Apples, 1899.
- Duncan, Mrs. M., Red Bluff, Cal.: Almonds, 1899.
- Dunlap, Henry M., Savoy, Ill.: Apples and pears, 1899 and 1900.
- Dutton, A. H., Youngstown, N. Y.: Apples, 1899.
- Ebeck, Joe, Argentine, Kans.: Apples, 1900.
- Ebersoll, George, Centerville, Ind.: Apples, 1899.
- Edwards, D. R., Versailles, Mo.: Apples, 1899-1900.
- Eliason, Alice, Centerville, Ind.: Apples, 1899.
- Elliott, Jessie P., Alquina, Ind.: Apples, 1899.
- Ellwanger & Barry, Rochester, N. Y.: Pears, 1900.
- Ennis, Robert T., Alloway, N. Y.: Apples, 1900.
- Facer, William D., Lyons, N. Y.: Apples, 1899.
- Falkner, N. K., Mesilla Park, N. Mex.: Apples, 1899.
- Farmers' Produce Association of Delaware, A. N. Brown, president, Wyoming, Del.: Apples, 1900.
- Farnsworth, W. W., Waterville, Ohio: Apples, 1900.
- Flack, William M., Cane River, N. C.; Apples, 1899.
- Flournoy, W. T., Marionville, Mo.: Apples, 1899.
- Fosselman, C. S., Weiser, Idaho: Apples, peaches, and pears, 1900.

- Foster Brothers, Halls Corners, N. Y.: Apples, 1899.
Francis, C. H., Altamont, Ill.: Apples, 1899.
Frost, George, Portersville, Cal.: Oranges, 1899-1900.
Fry, Mason, Odessa, Mo.: Apples, 1900.
Fuller, Henry E., Riverside, Cal.: Oranges, 1899-1900.
Gallegar, James, Argentine, Kans.: Apples, 1900.
Galloway, T. C., Weiser, Idaho: Apples, 1900.
Gano, W. G., Parkville, Mo.: Apples, 1899-1900.
Gansz, Fred., Lyons, N. Y.: Apples, 1900.
Garber, William, Argentine, Kans.: Apples, 1900.
Gardner, W. A., West Plains, Mo.: Apples, 1899.
Garretson, J. V., Floradale, Pa.: Apples, 1899.
Gleason, P., Leroy, N. Y.: Apples, 1899.
Goetzman, Albert, Lyons, N. Y.: Apples, 1900.
Goodman, Mrs. J. K., Lyons, N. Y.: Apples and peas, 1900.
Goodman, L. A., Kansas City, Mo.: Apples, 1899-1900.
Griest, Amos W., Floradale, Pa.: Apples, 1899.
Gunning, L. D., Brashear, Mo.: Apples, 1899.
Haden Brothers, Crozet, Va.: Apples, 1899.
Hanlon, J., Leroy, N. Y.: Apples, 1899.
Hanna, J. M., West Plains, Mo.: Apples, 1899.
Harpster, Henry, St. Peter, Ill.: Apples, 1899.
Harrington, Frank O., York Center, Iowa: Apples, 1900.
Harris, W. R., Tecumseh, Nebr.: Apples, 1899.
Hartley, C. P., Caldwell, Idaho: Apples, 1900.
Hartwell, B. W., Leroy, N. Y.: Apples, 1899.
Hatcher, M. L., Reba, Va.: Apples, 1899.
Hatley, J. S., Hudson, N. C.: Apples, 1899.
Hensey, Wilson, Bald Creek, N. C.: Apples, 1899-1900.
Hewitt, E. W., Arroyo, W. Va.: Apples, 1899.
Hiester, Gabriel, Harrisburg, Pa.: Apples, 1899.
Hiatt, W. S., Winchester, Va.: Apples, 1900.
Hillhouse, George S., Pierce City, Mo.: Apples, 1899.
Hoffman, Daniel, Arendtsville, Pa.: Apples, 1899.
Holsinger, Frank, Rosedale, Kans.: Apples, 1900.
Hotchkiss, C. M., Cheshire, Conn.: Apples, 1899.
Houk, F. M., Brashear, Mo.: Apples, 1899.
Huff, Perry, Versailles, Mo.: Apples, 1900.
Husband, Joseph, Leanderville, Ill.: Apples, 1899.
Huston, H. F., Lockport, N. Y.: Apples, 1900.
Idaho State Horticultural Society, C. P. Hartley, president, Caldwell, Idaho: Apples, pears, and plums, 1900.
Illinois State Horticultural Society, Henry M. Dunlap, president, Savoy, Ill.: Apples and pears, 1899-1900.
Imkee, H. W., Princeton, Ill.: Apples, 1900.
Indiana Horticultural Society, C. M. Hobbs, president, Bridgeport, Ind.: Apples, 1899.
Iowa State Horticultural Society, Charles F. Gardner, president, Osage, Iowa: Apples, 1900.
Jacobus, Philo, Niles, Cal.: Almonds, 1899.
James, G. G., Exeter, Mo.: Apples, 1899.
Jelinck, Frank, Crete, Nebr.: Apples, 1899.
Johnson, J. B., Manassas, Va.: Apples, 1899.
Johnston, J. B., New Wilmington, Pa.: Apples, 1899.

- Jones & Primel, Cuba, Mo.: Apples, 1899.
 Kansas State Horticultural Society, Fred Wellhouse, president, Topeka, Kans.: Apples and pears, 1899-1900.
 Keith, W. C., Mayview, Mo.: Apples, 1900.
 Keith, William P., Mayview, Mo.: Apples, 1900.
 Keller, C., Wyoming, Del.: Apples, 1900.
 Kempton, Joseph, Centerville, Ind.: Apples, 1899.
 Key, A., Argentine, Kans.: Apples, 1900.
 King, Columbus, Centerville, Ind.: Apples, 1899.
 Kimery, J. T., Neoga, Ill.: Apples, 1900.
 Kitterman, Enos, Centerville, Ind.: Apples, 1899.
 Kraft, Herbert, Company, Red Bluff, Cal.; Almonds, 1899.
 Kubicek, M., Crete, Nebr.: Apples, 1899.
 Labar, Wesley, Lockport, N. Y.: Apples, 1900.
 La Rash, S. D., Pekin, Ill.: Apples, 1899.
 Lawver, Rufus, Biglerville, Pa.: Apples, 1899.
 Leonard, C. N., Penfield, N. Y.: Apples, 1899-1900.
 Letterman, D. A., Green Mountain, N. C.: Apples, 1899.
 Linton, W. D., Patoka, Ill.: Apples, 1899.
 Livingston, A. H., Walla Walla, Wash.: Apples, 1899.
 Lucas, J. L., Salem, Mo.: Apples, 1899.
 Lupton, S. L., Winchester, Va.: Apples and pears, 1900.
 McCollough, U. S., Red Bluff, Cal.: Almonds, 1899.
 McInturff, C. R., Paint Gap, N. C.: Apples, 1899.
 McKeown, S. H., Gerrardstown, W. Va.: Apples, 1899.
 McPeeters, C. L., Bald Creek, N. C.: Apples, 1899-1900.
 Mage, Mrs. J., Salem, Mo.: Apples, 1899.
 Mahan Produce Co., Arroyo, W. Va.: Apples, 1899.
 Maine State Pomological Society, W. M. Munson, president, Orono, Me.: Apples, 1899.
 Malone, T. E., Wilson, Mo.: Apples, 1899.
 Manchester, Elbert, Bristol, Conn.: Apples, 1899.
 Mason, Walter, Belleplaine, Kans.: Apples, 1899.
 Marshall Brothers, Arlington, Nebr.: Apples, 1899.
 Maude, Charles A., Riverside, Cal.: Oranges, 1899-1900.
 May, J. E., Wilson, Mo.: Apples, 1899.
 Merriman, J. H., New Britain, Conn.: Apples, 1899.
 Merritt, E. T., Weiser, Idaho: Peaches and pears, 1900.
 Michigan State Agricultural College Experiment Station: Apples, crab apples, and pears, 1900.
 Miller, G. P., Martinsburg, W. Va.: Apples, 1899.
 Miller, J. J., Washington, Va.: Apples, 1899.
 Miller, W., Rhea, Ark.: Apples, 1900.
 Miller, W. S., Gerrardstown, W. Va.: Apples, 1899.
 Milman, George A., Las Cruces, N. Mex.: Apples, 1899.
 Missouri State Horticultural Society, N. F. Murray, president, Oregon, Mo.: Apples, 1899-1900.
 Mitchem, William, Argentine, Kans.: Apples, 1900.
 Montgomery, A., Whittier, Cal.: Almonds, 1899.
 Moore, Charles, Southington, Conn.: Apples, 1899.
 Moulton, Joseph, Springvale, Me.: Apples, 1899.
 Mount, C. F., Mountainview, Mo.: Apples, 1899.
 Murray, N. F., & Sons, Oregon, Mo.: Apples, 1900.
 Murrell, George E., Fontella, Va.: Apples, 1899-1900.

- Myers, Calvin, Mulvane, Kans.: Apples, 1899.
- Nebraska State Horticultural Society, George H. Marshall, president, Arlington, Nebr.: Apples, 1899.
- Neff, Ira, Marionville, Mo.: Apples, 1900.
- Nelson, A., Lebanon, Mo.: Apples, 1899.
- Nelson, J. A., Marshfield, Mo.: Apples, 1899.
- Newby, Thomas T., Carthage, Ind.: Apples, 1899.
- Newland, William, Alquina, Ind.: Apples, 1899.
- New Mexico Agricultural College, Mesilla Park, N. Mex.: Apples, 1899.
- New York State Agricultural Experiment Station, Geneva, N. Y.: Apples and plums, 1900.
- New York State Paris Exposition Commission, New York City: Apples, pears, and plums, 1899-1900.
- North Carolina Department of Agriculture, Raleigh, N. C.: Apples, 1899-1900.
- Norwood, W. M., Rhea, Ark.: Apples, 1900.
- Ohio State Horticultural Society, E. H. Cushman, president, Euclid, Ohio: Apples, 1900.
- Olden Fruit Company, Olden, Mo.: Apples, 1900.
- Ozark Orchard Company, Goodman, Mo.: Apples, 1900.
- Page, W. S., Bethany, N. Y.: Apples, 1899.
- Parker, J. O., Larkin, Kans.: Apples, 1899.
- Patchett, Joseph, Billsboro, N. Y.: Apples, 1899.
- Paul & Ellison, Crozet, Va.: Apples, 1899.
- Paylor, John, Reeds Corners, N. Y.: Apples, 1900.
- Payne, John, Argentine, Kans.: Apples.
- Pearmain, J., Salem, Mo.: Apples, 1899.
- Pearson, W. M., Mexico, Mo.: Apples, 1899.
- Pedersen, Peder, Huntingdon Valley, Pa.: Apples, 1899.
- Peninsula Horticultural Society, Joseph E. Carter, president, Dover, Del.: Apples and pears, 1900.
- Perrine, I. B., Bluelakes, Idaho: Apples, 1899-1900; plums, 1900.
- Phinney, C. S., Standish, Me.: Apples, 1899.
- Phoenix, F. S., Bloomington, Ill.: Apples, 1899.
- Pierce, L. B., Tallmadge, Ohio: Apples, 1900.
- Pierce, O. R., Hudson, Mich.: Apples, 1899.
- Pillow, W. H., Reeds Corners, N. Y.: Apples, pears, and plums, 1900.
- Platt, E. B., Milford, Conn.: Apples, 1899.
- Platt, George F., & Son, Milford, Conn.: Apples, 1900.
- Platt, N. D., Milford, Conn.: Apples, 1899.
- Post, Herbert, Fort Worth, Tex.: Pecans, 1899.
- Powell, George T., Ghent, N. Y.: Apples and pears, 1899-1900.
- Prisch, D. L., Middleport, N. Y.: Apples, 1900.
- Proffitt, D. R., Burnsville, N. C.: Apples, 1899.
- Pullen, A., Milford, Del.: Apples and pears, 1900.
- Raffensparger, Lizzie J., Arendtsville, Pa.: Apples, 1899.
- Ranahan, Thomas, Weiser, Idaho: Apples, 1900.
- Rankin, J., Martinez, Cal.: Walnuts, 1899.
- Ray, G. D., Burnsville, N. C.: Apples, 1899.
- Ray, J. S., Burnsville, N. C.: Apples, 1899.
- Ray, R. F., Baldereek, N. C.: Apples, 1900.
- Ray, R. H., Cane River, N. C.: Apples, 1900.
- Raymond, H. R., Alvord, Mo.: Apples, 1899.
- Reed, Homer, Kansas City, Mo.: Apples, 1900.
- Reeves, Elmer, Waverly, Iowa: Apples, 1900.

- Rhind, Duncan, Canandaigua, N. Y.: Apples and plums, 1900.
- Rich, A., Rhea, Ark.: Apples, 1900.
- Richmond Horticultural Society, Richmond, Mo.: Apples, 1899.
- Rider, Frank, Thornton, Wash.: Apples, 1899.
- Riverside Orange Company, Riverside, Cal.: Oranges, 1899-1900.
- Roberson, F. H., Purdy, Mo.: Apples, 1899.
- Roberts, W. M., Republic, Mo.: Apples, 1899.
- Robinson, Mrs. Thomas R., Halls Corners, N. Y.: Apples, 1899.
- Robnett, D. A., Columbia, Mo.: Apples, 1900.
- Rodenburg, Charles, Richmond, Ind.: Apples, 1899.
- Rogers, Miss Alla, Lyons, N. Y.: Apples, 1900.
- Rogers, E., New Britain, Conn.: Apples, 1899.
- Roschi, J., Nevada, Mo.: Apples, 1899.
- Ross, J. A., Thornton, Wash.: Apples, 1899.
- Rousch, O. S., Salem, Mo.: Apples, 1899.
- Russell, Elmira, Richmond, Ind.: Apples, 1899.
- Rutherford, Joseph, Alquina, Ind.: Apples, 1899.
- Ryan & Richardson, Leavenworth, Kans.: Apples, 1899-1900.
- Scholl, Elias, Alquina, Ind.: Apples, 1899.
- Sedgwick, Richard, Richmond, Ind.: Apples, 1899.
- Sessen, G. L., Westplains, Mo.: Apples, 1899-1900.
- Shaeffer, W. E., Lockport, N. Y.: Apples, 1900.
- Shaw, Fred, Summerhill, Ill.: Apples, 1889-1900.
- Shields, Mrs. Emily, Mills, Cal.: Almonds, 1899.
- Shirley, A., Salem, Mo.: Apples, 1899.
- Slaymaker, A. W., Camden, Del.: Apples, 1900.
- Smith, E., & Son, Geneva, N. Y.: Pears, peaches, and plums, 1900.
- Smith, Fred D., Mayview, Mo.: Apples, 1900.
- Smith, George W., Mayview, Mo.: Apples, 1900.
- Smith, Jacob E., Banners Elk, N. C.: Apples, 1899.
- Smith, James F., Mayview, Mo.: Apples, 1900.
- Smith, W. Q., Hilton, N. Y.: Apples, 1900.
- Smith, W. & T. Company, Geneva, N. Y.: Apples, 1900.
- Soverhill, S. G., Tiskilwa, Ill.: Apples, 1899.
- Spadden, J. M., Salem, Mo.: Apples, 1899.
- Spencer, George W., Westfield, N. Y.: Pears, 1900.
- Stephens, E. F., Crete, Nebr.: Apples, 1899.
- Stone, George A., Richmond, Mo.: Apples, 1899-1900.
- Straub, John, Argentine, Kans.: Apples, 1900.
- Strong, Mrs. H. W. R., Whittier, Cal.: Walnuts, 1899.
- Stuart Pecan Company, Ocean Springs, Miss.: Pecans, 1899.
- Tabor, R. H., Redbluff, Cal.: Almonds, 1899.
- Taft, F. L. B., Leroy, N. Y.: Apples, 1899.
- Taubman, Ed., Lexington, Mo.: Apples, 1900.
- Taylor, Hughey, Waitsburg, Wash.: Apples, 1899.
- Taylor, Robert, Las Cruces, N. Mex.: Apples, 1899.
- Tenny, Delos, Hilton, N. Y.: Apples, 1899-1900.
- Thomas, Ross, Alquina, Ind.: Apples, 1899.
- Trimble, McGill & Co., Seymour, Mo.: Apples, 1899.
- Troutman, John H., Lakin, Kans.: Apples, 1899.
- Vanderbilt, Charles, Lyons, N. Y.: Apples, 1899.
- Van Shuler, Duane, Hilton, N. Y.: Apples, 1900.
- Vickars, James S., Mayview, Mo.: Apples, 1899.
- Vincenheller, W. G., Fayetteville, Ark.: Apples, 1900.
- Virginia State Horticultural Society, Samuel B. Woods, president, Charlottesville, Va.; Apples and pears, 1899-1900.

- Voris, F. D., Neoga, Ill.: Apples, 1900.
 Ward, William, Leroy, N. Y.: Apples, 1899.
 Warneke, Henry B., Lyons, N. Y.: Apples, 1900.
 Warner, E. C., New Haven, Conn.: Apples, 1899.
 Washington, B., Stonehill, Mo.: Apples, 1899.
 Wayman, H. R., Alvord, Mo.: Apples, 1899.
 Webster County Horticultural Society, Seymour, Mo.: Apples, 1899.
 Weidner, Aaron I., Arendtsville, Pa.: Apples, 1899.
 Weller, P., Salem, Mo.: Apples, 1899.
 West Virginia State Horticultural Society, R. C. Burkhardt, president, Martinsburg, W. Va.: Apples, 1899.
 Whatley, Walter, Crozet, Va.: Apples, 1899.
 Williams, Prescott, Williamsburg, Mass.: Apples, 1899.
 Williams, W. W., Hilton, N. Y.: Apples, 1899.
 Wilson, Edgar, Boise, Idaho: Apples, 1900.
 Wilson, J. S., Wilson, Mo.: Apples, 1900.
 Winn, Charles G., Griggsville, Ill.: Apples, 1899.
 Woldert Grocery Company, Tyler, Tex.: Pecans, 1899.
 Wood, A., Carlton, N. Y.: Apples, 1899.
 Wood, C. A., Brashear, Mo.: Apples, 1899.
 Wood, C. B., Washington, Va.: Apples, 1899.
 Woodrome, B. C., Westplains, Mo.: Apples, 1899.
 Woodside, L. B., Salem, Mo.: Apples, 1899.
 Woodward & Jaques, Wrights Corners, N. Y.: Apples, 1900.
 Wray, W. B., Cane River, N. C.: Apples, 1899-1900.
 Wright, Charles, Seaford, Del.: Apples and peaches, 1900.
 Wright, Thomas, Kelsey, N. C.: Apples, 1899.
 Young, B. M., Morgan City, La.: Pecans, 1899.
 Young, William A., Butler, Ill.: Apples, 1899.

CLASS 46.—*Trees, shrubs, ornamental plants and flowers.*

- Burpee, W. Atlee, & Co., Philadelphia, Pa.: Collection 50 varieties sweet peas in bloom in pots, displayed in temporary competition, June 13, 1900.
 Lothrop & Higgins, East Bridgewater, Mass.: Collection of dahlias in open air.
 Michigan Seed Company, South Haven, Mich.: Collection of gladioli and dahlias in open air.

CLASS 47.—*Plants of the conservatory.*

- Studer, Nicholas, Washington, D. C.: Photographs of giant ferns (*Nephrolepis Washingtoniensis*, *erecta*, and *pendula*).

CLASS 48.—*Seeds and plants for gardens and nurseries.*

- Michigan Seed Company, South Haven, Mich.: Collection of garden seeds.
 Trumbull & Beebe (California Paris Commission), San Francisco, Cal.: Collection of garden seeds.

GROUP X.—FOOD STUFFS.

CLASS 55.—*Equipment and methods employed in the preparation of food.*

- Armour & Co., Chicago, Ill.: Operations of meat slaughter and packing.
 Chase, A. J., Sudbury, Boston, Mass.: Chase's patent cold-blast butter cooler.
 Enterprise Manufacturing Company, Philadelphia, Pa.: Food mills.
 Libby, McNeill & Libby, Union Stock Yards, Chicago, Ill.: Model of packing house in operation.

Liquid Air Refrigeration and Power Company, Boston, Mass.: Chase's cold-blast refrigerator.

North Brothers Manufacturing Company, Philadelphia, Pa.: Ice-cream freezers and accessories.

Swift & Co., Union Stock Yards, Chicago, Ill.: Model of a refrigerator railway car.

Union Stock Yard Company, Chicago, Ill.: Photographic illustration of facilities and methods of marking cattle, sheep, and swine.

CLASS 56.—*Farinaceous products and their derivatives.*

Alliance Milling Company, Depton, Tex.: Flour manufactured from soft winter wheat.

American Cereal Company, Chicago, Ill.: Collective exhibit of cereal products.

Battle Creek Sanitarium Health Food Company, Battle Creek, Mich.: Cereal products and health foods.

Cascade Mill, Akron, Ohio: Cereals—Wheat Farina, Graham, Wheat Graham, Amber Graham.

Cereal Food Company, Peoria, Ill.: Hulled corn.

Cereal Machine Company, Worcester, Mass.: Shredded wheat products.

Cereal Mill, Akron, Ohio: Cereals—American steel-cut oatmeal, farinose, cracked wheat, oatmeals, oat flour, corn meal, golden maize, hominy, etc.

Decatur Cereal Mill Company, Decatur, Ill.; White-corn products, prepared by modern processes of milling. All kiln-dried.

Del Monte Milling Company, San Francisco, Cal.: Flour, cereals, and whole grains.

Empire Mill, Akron, Ohio: Cereals—Hominy, corn meal, corn flour, rye flour, barley groats.

Health Food Company, 61 Fifth avenue, New York: Wheatena, infants' and invalids' food.

Imperial Mill, Chicago, Ill.: Oatmeals, steel cut and ground.

Indianapolis Hominy Mills, Indianapolis, Ind.: Maize products for food and for brewing.

National Starch Manufacturing Company, 1 Broadway, New York: Pearl starch, maizena (brand of corn flour), corn oil.

North Star Mills, Cedar Rapids, Iowa: Cereals—Flaked-oat groats, corn meal, bolted corn meal, cream corn meal, and corn flour.

Pillsbury-Washburn Company, Minneapolis, Minn.: Exhibit of flour and cereal products.

Postum Cereal Company, Battle Creek, Mich.: Grape nuts, breakfast food, and postum cereal coffee.

Sanitas Nut Food Company, Limited, Battle Creek, Mich.: Nut foods, nut meal, brumose, malted nuts, and protose.

Scotch Oats Mill, Kansas City, Mo.: Rolled oats, Scotch rolled oats.

Sperry Flour Company, San Francisco, Cal.: "Germea," a food for infants, etc.

Stone Mill, Akron, Ohio: Quaker wheat flour, wheat products.

United States Frumentum Company, Detroit, Mich.: Frumentum corn flakes, also white corn flour.

Washburn-Crosby Company, Minneapolis, Minn.: Exhibit of flour and cereal products.

CLASS 57.—*Bread and pastry.*

National Biscuit Company, Chicago, Ill., and New York: Exhibit of leading forms of bakery goods, biscuits, cakes, etc., manufactured in the United States.

CLASS 58.—*Preserved meats, fish, vegetables, and fruit.*

Ames, J. O., Red Bluff, Cal.: Kelsey plums.

Alaska Packers' Association, San Francisco, Cal.: Canned salmon.

- Anderson, O. M., Red Bluff, Cal.: White cling peaches.
- Anker Manufacturing Company, New York City: Bouillon capsules, liquid bouillon, junket capsules.
- Armour & Co., Chicago: Canned foods, sausages, smoked meats, extract of beef.
- Armour Packing Company, Kansas City, Mo.: Preserved meats, pork and beef products.
- Barataria Canning Company, Biloxi, Miss.: Canned crab meat, shrimp, fish, oysters; figs, canned and preserved.
- Barr, G. W., Fresno, Cal.: Dried fruits.
- Beardsley's, J. W., Sons, New York City: Shredded codfish, sliced smoked beef, boneless herring.
- Bouillon Stock Manufacturing Company, The, Chicago: Wahl's bouillon stock, made from yeast plant only.
- Brown, Paul Taylor, Company, New York City: Vegetables in tin and in glass.
- California Fish Company, Los Angeles, Cal.: Sardines.
- California Paris Exposition Commission, San Francisco, Cal.: Canned goods.
- Campbell, Joseph, Preserve Company, Camden, N. J.: Soups.
- Castle Brothers, Fresno, Cal.: Dried apricots, peaches, and pears.
- Chipman, N. P., Red Bluff, Cal.: Muir peaches.
- Cone, D. S., Red Bluff, Cal.: Dried prunes, peaches, and pears.
- Curtice Brothers Company, Rochester, N. Y.: Canned fruits, vegetables, soups, and meats; preserved fruits and vegetables.
- Dairymen's Union, The, San Francisco, Cal.: Smoked meats.
- Department of Agriculture United States, Bureau of Animal Industry, Washington, D. C.: Collective exhibit of meats, frozen, salted, and canned; meat products.
- Doxsee, J. H., & Sons, Islip, N. Y.: Canned clams and clam juice.
- Duncan, Mrs. M., Red Bluff, Cal.: Dried fruits.
- Erie Preserving Company, Red Bluff, Cal.: Canned fruits and vegetables; table delicacies.
- Forsythe, William, Fresno, Cal.: Dried figs and raisins, seeded raisins.
- Franco-American Food Company, The, Jersey Heights, N. J.: Preserved soups and meats.
- Fresno Chamber of Commerce, Fresno, Cal.: Dried fruits.
- German-American Provision Company, Chicago: Canned meats and sausages.
- Geneva Preserving Company, Geneva, N. Y.: Canned fruits and vegetables.
- Goetjen, N., San Francisco, Cal.: Canned soups, meats, and vegetables.
- Hickmott Canning Company, San Francisco, Cal.: Canned asparagus.
- Hobbs, A. L., Fresno, Cal.: Dried fruit.
- Howell, B. F., Red Bluff, Cal.: Nectarines.
- Huckins, J. H. W., & Co., Boston, Mass.: Canned soups and deviled meats.
- Imperial Packing Company, Canajoharie, N. Y.: Canned bacon, beef, and ham, sliced.
- Inderriaden, J. B., Fresno, Cal.: Dried fruit.
- Jensen, N. P., Fresno, Cal.: Dried fruit.
- Kapp & Street, San Francisco, Cal.: Canned meats, tamales, chili con carne, frijoles, enchilades, chicken soup.
- Kemp, Day & Co., New York: Canned vegetables, fruits, and fish products.
- Kimble Estate, Fresno, Cal.: Dried fruits.
- Knox, Charles B., Johnstown, N. Y.: Gelatine for domestic purposes.
- Lewis, W. L., Fresno, Cal.: Dried fruit.
- Lewis, D. W., Fresno, Cal.: Dried fruits.
- Libby, McNeill & Libby, Chicago: Canned meats, soups, smoked meats, sausage.
- Philadelphia, 1876, bronze medal; Paris, 1878, gold medal.
- Los Angeles Chamber of Commerce, Los Angeles, Cal.: Dried fruit.
- Loud & Gerling, Pomona, Cal.: Dried apricots.
- McMenamin & Co., Hampton, Va.: Deviled crabs, in tins.

- Malaga Cooperative Company, Fresno, Cal.: Dried fruits.
- Malone & Smith, Ontario, Cal.: Dried prunes.
- Marcariar & Co., Fresno, Cal.: Dried fruits.
- Michigan Carbon Works, Detroit, Mich.; Gelatine, for food and for mechanical arts.
- Miley, A. C., Fresno, Cal.: Dried fruit.
- Minnehaha Vineyard, Fresno, Cal.: Dried fruit.
- Morris, Nelson, & Co., Chicago: Canned meats.
- Neal, John R., & Co., Boston, Mass.: Finan haddie.
- New York State Commission, Lyons, N. Y. Collective exhibit, as follows:
- The Petri Fruit Company.
- Bone Brothers.
- Shaeffer, W. E.
- Wayne County exhibitors.
- Noble Brothers, Fresno, Cal.: Dried fruits.
- Pacific Steam Whaling Company, San Francisco, Cal.: Canned salmon.
- Pacine Packing Company, Fresno, Cal.: Dried fruits.
- Richards & Roberts, Dover, Del.: Canned meats, oysters, plum pudding.
- Runyon, E. W., Red Bluff, Cal.: Crawford peaches.
- Russell, Edward T., & Co., Boston, Mass.: Canned American sardines.
- Sacramento River Packers' Association, San Francisco, Cal.: Canned salmon.
- San Gabriel Fruit Company, San Gabriel, Cal.: Dried apricots and peaches.
- Santa Ana Chamber of Commerce, Santa Ana, Cal.; Dried prunes, apricots, and peaches.
- Sea Beach Pickling Works, Warrenton, Oreg.: Minced sea clams.
- Swift & Company, Chicago: Canned meats and food products; hams, bacon, lard.
- Tamale, I. X. L., Company, San Francisco, Cal.: Tamales, frijoles, enchilades, chili con carne, chicken soup.
- Trowbridge, D. S., Fresno, Cal.: Dried fruits.
- Van Camp Packing Company, Indianapolis, Ind.: Canned meats, soups, and vegetables.
- Viau, Lewis, Fresno, Cal.: Dried fruits.
- Voice Brothers, Fresno, Cal.: Dried yellow and Stanwick nectarines.
- Wagner, Martin, Company, Baltimore, Md.: Canned pineapple.
- Welch Grape Juice Company, Westfield, N. J.: Grape juice.
- Winkle, G. W., Fresno, Cal.: Dried fruit.
- Wonsen, William H., & Son, Gloucester, Mass.: Halibut.
- Zimmerman Brothers, Fresno, Cal.: Dried fruit.

CLASS 59.—Sugar and confectionery—Condiments and relishes.

- Baker, Walter, & Co., Limited, Dorchester, Mass.: Cocoa and chocolate preparations.
- Bishop & Co., Los Angeles, Cal.: Crystallized glazed fruits.
- Clarksville Cider Company, St. Louis, Mo.: Vinegar.
- California Canneries Company, Limited: Canned fruits, jams, and preserves.
- California Packing Company, San Francisco, Cal.: Preserves and jams, condiments and relishes.
- Crystal Salt Works, Los Angeles, Cal.: Table salt in glass jars, half-ground salt for dairy or table purposes.
- Curtice Brothers Company, Rochester, N. Y.: Maple sirup and sugars.
- Department of Agriculture, Washington, D. C.: Collective exhibit of sugars, sirups, and confections.
- Dillings & Co., Marion, Ind.: Confections, satin-finish stick candy and buttercup goods packed in tin or glass.

- Flicklinger, J. H., Company, San Jose, Cal.: Canned fruits.
 Gulden, Charles, 46-48 Elizabeth street, New York: Prepared mustards.
 Hayne & Whitaker, New York: Milk sugar.
 Heinz, H. J., Company, Pittsburg, Pa.: Pickles, preserves, and food products, 57 varieties shown; including tomato ketchup, tomato chutney, and tomato soup; baked beans with tomato sauce, sweet pickles, midget gherkins, India relish, and evaporated horseradish.
 Joslin, C. T., Malden, Mass.: Maple sirups and sugars.
 Kenny, Seth, & Son, Morristown, Minn.: Sorghum molasses.
 Los Alamitos Beet Sugar Company, Los Alamitos, Cal.: Beet sugar and beet products.
 Marsh, Miss Bessie, South Pasadena, Cal.: Crystallized flowers.
 Louisiana Sugar Planters' Association, New Orleans, La.: Cane sugar, molasses, massequite, etc.
 Michigan Beet Sugar Association, Detroit, Mich.: Collective exhibit of beet sugar of various grades.
 Pan Confection Company, Chicago, Ill.: Candies and confections.
 Pioneer Salt Works, Mount Eden, Cal.: Table salt, rock salt for manufacturing purposes, dairy salt, coarse salt, and refined table salt.
 Redondo Salt Works, Los Angeles, Cal.: Table salt in glass jars.
 Richardson, William D., Fredericksburg, Va.: Pickles.
 San Francisco Packing Company, San Francisco, Cal.: Green pickled California olives.
 Sen Sen Company, Rochester, N. Y.: Chewing gum and breath perfume.
 Shields, Mrs. Emily, Mills, Cal.: Orange marmalade.
 Soniat, L. M., Dorseyville, La.: Cane sugar, molasses, and can products.
 Southern California Salt Company, Los Angeles, Cal.: Table salt.
 Spreckels Sugar Company, Salinas, Cal.: Beet sugar and beet products.
 Thrasher, A. J., Pittsburg, Pa.: Maple sugar, sirup.
 Towle Syrup Company, St. Paul, Minn.: Log cabin maple sirups and sugars.
 Union Pacific Salt Works, San Francisco, Cal.: Table salt.
 Welch Maple Sugar Company, Burlington, Vt.: Maple sirups and sugars.
 Williams, George, Los Angeles, Cal.: Worcester sauce.

CLASS 60.—*Wines and brandies.*

- Adams, A. P., & Co., Fresno, Cal.: Wine.
 Albertz, Ferdinand, Cloverdale, Cal.: Wines and brandies.
 Baldwin, C. A., West Side, Santa Clara, Cal.: Wines.
 Barton Estate Company, Fresno, Cal.: Wines and brandies.
 Beard, John L., Warm Springs, Cal.: Wines.
 Ben Lomond Wine Company, Ben Lomond Vineyard, Santa Cruz, Cal.: Wines.
 Beringer Brothers, St. Helena, Cal.: Wines and brandies.
 Boettcher, H., Los Angeles, Cal.: Wines and brandies.
 Brotherhood Wine Company, New York: Wine.
 California Paris Exposition, San Francisco, Cal.: Wines, red and white; sweet wines and boiled wines; sparkling wines, brandies.
 California Wine Association, San Francisco, Cal.: Wines.
 California Winery Company, Sacramento, Cal.: Wines.
 Chaix & Bernard, San Francisco, Cal.: Wines.
 Crellin, Louis, Pleasanton, Cal.: Wines.
 Cupertino Wines Company, Las Palmas Vineyard, Mountain View, Cal.: Wines, Cabernet Franc, Cabernet Sauvignon, Semillion.
 Dewey & Sons, New York: Wines.
 Duval, A., Livermore, Cal.: Wine.

Eisen Vineyard, Fresno, Cal.: Wines.

Department of Agriculture, Division of Chemistry, Washington, D. C.: Ordinary wines, red and white; sweet wines and boiled wines; sparkling wines, brandies.

Empire State Wine Company, Penn Yan, N. Y.: Wines.

Engels & Krudwig Wine Company, Sandusky, Ohio: Wines and brandies.

Finke's, A., Widow, San Francisco, Cal.: Wines.

Florida Brandy Distilling Company, Tallahassee, Fla.: Wines, brandies, and cordials.

Garrett & Co., Weldon, N. C.: Wines.

Garmain, Edward, Wine Company, Los Angeles, Cal.: Wines.

Garmania Wine Cellars Company, Hammondsport and Rheims, N. Y.: Wines and brandy.

Gier, Theodore, Company, Oakland, Cal.: Wines.

Grierson, Oldham & Company, San Francisco, Cal.: Wines and brandies.

Guasti-Secondo, Los Angeles, Cal.: Wines.

Gundlach Bundschu Wine Company, Bacchus Vineyards, Rhine Farm, Sonoma, Cal.: Wines and brandies.

Gunn, James, O. B., Windsor, Cal.: Wines.

Hammond, Charles Miffin, Ma Tel Vineyard, Upper Lake, Cal.: Wines and brandy.

Haraszthy, Arpad, San Francisco, Cal.: Wines.

Hastings Estate, La Jota Vineyard, Angwin, Cal.: Wines.

Heney, Richard, jr., Chateau Ricardo Vineyard, Cupertino, Cal.: Wines.

Hess, Frederick, Pine Crest Vineyard, Howell Mountain, Napa County, Cal.: White wine, Reisling.

Hoelscher, William, & Co., San Francisco, Cal.: Wines.

Hommell, M., 924 Clinton street, Sandusky, Ohio: Wines.

Italian-Swiss Agricultural Colony, Asti, Cal.: Wines and brandy.

Keyes, W. S., Liparita Vineyard, Angwin, Cal.: Wines.

Koster, John L., Mount Hamilton Vineyard, San Jose, Cal.: Wines.

Lake Keuka Wine Company, Hammondsport, N. Y.: Wines.

McIver, C. C., Linda Vista Vineyard, Mission San Jose, Cal.: Wines.

Malta, George H., St. George Vineyard, Fresno, Cal.: Wines.

Mann, C. M.: Santa Rosa, Cal.: Wines and brandy.

Masson, Paul, San Jose, Cal.: Wines.

Merithew, J. C., Prospect Vineyard, Westside, Cal.: Wines and brandy.

Meyer, John, Santa Cruz, Cal.: Wines.

Migilavacca, G., Napa City, Cal.: Wine.

Monticello Wine Company, Charlottesville, Va.: Wines.

New Hammondsport Wine Company, Hammondsport, N. Y.: Wines.

Palmtag, William, Palmtag's vineyard, Hollister, Cal.: Wines and brandy.

Pleasant Valley Wine Company, Rheims, N. Y.: Wine.

Radovich, Bozo, San Jose, Cal.: Wine.

Repold & Company, San Francisco, Cal.: Wines and brandies.

St. Hubert Wine Company, San Francisco, Cal.: Wine.

San Luis Vineyard, Tallahassee, Fla.: Wines and brandies.

Schilling, C., & Co., San Francisco, Cal.: Wines.

Schram, Jacob, Schramberger Vineyard, St. Helena, Cal.: Wines.

Sierra Madre Vintage Company, Lamanda, Cal.: Wines and brandy.

Smith, Julius Paul, Olivina Vineyard, Cal.: Wines.

Soramo, G., Los Angeles, Cal.: Wines and brandy.

Southern California Wine Company, Los Angeles, Cal.: Wines and brandy.

To-Kalon Wine Company, Washington, D. C.: Wines.

Urbana Wine Company, Urbana, N. Y.: Wines.

Vina Vineyard and Distilling Company, Vina, Cal.: Brandies.

Wehner, William, Lomas Azules Vineyard, Evergreen, Cal.: Wines.
 West, George, & Sons, El Pinal Vineyard, Stockton, Cal.: Wines and brandies.
 Wetmore-Bowen Company, Cresta Blana Vineyard, Livermore and San Francisco, Cal.: Wines.
 Woollacott, H. J., Los Angeles, Cal.: Wines and brandy.
 Xander, Christian, Washington, D. C.: Wines.

CLASS 61.—*Sirups and liqueurs, distilled spirits, commercial alcohol.*

Beck, Joseph, & Co., New York: Whisky.
 Bernheim Brothers, Louisville, Ky.: Bourbon whiskies; Chicago, 1893, medal.
 Cook & Bernheimer Company, 144 Franklin street, New York: Old Valley and Mount Vernon whiskies.
 Department of Agriculture, United States, Division of Chemistry, Washington, D. C.:
 Collective exhibit of whiskies, rums, alcohols, sirups, and liquors.
 Faure, M., Los Angeles, Cal.: Tonic made from fruit juices (Independence).
 Florida Brandy Distilling Company, Tallahassee, Fla.: Cordial.
 Heublein, G. T., & Bros., Hartford, Conn.: Whiskies and cocktails.
 Kirk, H. B., & Co., 67-69 Fulton street, New York: Old Crow rye whisky.
 Large Distilling Company, Pittsburg, Pa.: Rye whiskies.
 McCulloch, J. W., Owensboro, Ky.: Green River whisky.
 Maryland Distilling Company, Baltimore, Md.: Rye whiskies.
 Meadville Distilling Company, Vallyonia, Pa.: Rye whiskies.
 Netter, David & Co., Philadelphia, Pa.: Rye whisky, Telegram whisky.
 Rheinstrom, Bettman, Johnson & Co., Cincinnati, Ohio: Liquors, cordials, and bitters.
 Steinhart Bros. & Co., 134 Mott street, New York: Roxbury rye whisky.
 Stitzel Brothers, Louisville, Ky.: Bourbon whisky.
 Victor Malt Whiskey Company, San Francisco, Cal.: Malt whisky.
 Xander, Christian, Washington, D. C.: Cordials and bitters.

CLASS 62.—*Various beverages.*

American Brewing Company, Rochester, N. Y.: Beers.
 Baltz, J. & P., Brewing Company, Philadelphia, Pa.: Pale and dark lagers.
 Beadleston & Woerz, New York: Gold Label, German Brew, lager, Culmbacher beers.
 Bethesda Mineral Spring Company, Waukesha, Wis.: Mineral waters.
 Bolen & Byrne Manufacturing Company, New York: Ciders and beers.
 Clarksville Cider Company, St. Louis, Mo.: Cider.
 Department of Agriculture, Division of Chemistry, Washington, D. C.: Collective exhibit of ales, beers, ciders, fermented drinks, and mineral waters.
 Feigenspan, Christian & Co., Newark, N. J.: India pale ale, etc.
 Goebel Brewing Company, Limited, Detroit, Mich.: Beer, porter, and malt extract.
 Gund, John, Brewing Company, La Crosse, Wis.: Extra pale and Peerless ale.
 Heissler & Junge Company, Chicago, Ill.: Malt extract.
 Heurich, Christian, Brewing Company, Washington, D. C.: Maerzen and Senate beers.
 Ice and Cold Storage Company, Los Angeles, Cal.: Ginger ale.
 Indianapolis Brewing Company, Indianapolis, Ind.: Beers, Duesseldorfer, etc.
 Jackson, G. H. T., Napa Soda Springs, Cal.: Natural aerated water.
 Lembeck & Betz, Eagle Brewing Company, Jersey City, N. J.: Beers, Bayerisches Hofbrau, American Club, and Extra.

- Liebmann's, S., Sons Brewing Company, 36 Forrest street, Brooklyn, N. Y.: Beer in bottles, pale beer, Rheingold, and Wuerzburger beer.
- Lincoln Springs, Saratoga Springs, N. Y.: Mineral water.
- Long Island Brewing Company, New York: Beers, Black Label, etc.
- Quinnipiac Brewing Company, New Haven, Conn.: Beers.
- Saegertown Mineral Springs Company, Saegertown, Pa.: Ginger ale, sarsaparilla, birch, lemon sour, and mineral water.
- San Francisco Breweries, Limited, San Francisco, Cal.: Export beer.
- Schoenhofen, P., Brewing Company, Chicago, Ill.: Beers, Edelweiss, Export, and Schoenhofenbrau.
- Seattle Brewing and Malting Company, Seattle, Wash.: Rainier beer.
- Vartray Water Company, 33-39 Franklin street, Buffalo, N. Y.: Ginger ale, sarsaparilla, seltzer, soda water, and sparkling water.
- White Rock Mineral Springs Company, Waukesha, Wis.: White Rock ozonate mineral spring water.

List of employees for Groups VII, VIII, and IX and dates of service.

Dodge, Charles Richards, director of agriculture:

Appointed December 1, 1898, to February 28, 1900, at \$3,300.

March 1 to August, 1900, at \$4,500.

August, 1900, to December 28, 1900, at \$4,200.

December 29, 1900, to February 15, 1901, at \$3,300.

Date of retirement, February 15, 1901.

Farmer, James L.:

Chief clerk—Appointed February 4 to November 30, 1899, at \$1,500.

Assistant director of agriculture—

Appointed December 1, 1899, to February 28, 1900, at \$2,400.

March 1, 1900, to June 30, 1900, at \$3,000.

July 1, 1900, to January 3, 1901, at \$2,700.

January 4, 1901, to February 15, 1901, at \$2,400.

Date of retirement, February 15, 1901.

Bean, Tarleton H., expert, fish-food exhibit:

Appointed March 1 to 31, 1899, at \$1,800.

Date of retirement, March 31, 1899.

Floyd, M. L., tobacco expert:

Appointed May 1 to June 30, 1899, at \$1,600.

Date of retirement, June 30, 1899.

Wilson, J. A., expert in agriculture:

Appointed June 1 to December 31, 1899, at \$1,400.

January 1 to June 30, 1900, at \$2,000.

July 1 to September 15, 1900, at \$1,700.

September 16 to December 15, 1900, at \$2,000.

Date of retirement, December 15, 1900.

Flournoy, P. P., draftsman:

Appointed May 12 to June 25, 1899, at \$1,000.

August 1 to September 30, 1899, at \$1,200.

Dodge, J. R., expert in wools:

Appointed June 1 to July 31, 1899, at \$6 a day.

November 1 to 30, 1899, at \$6 a day.

Date of retirement, November 30, 1899.

Snow, B. W.:

Expert, cereal foods—Appointed June 15 to September 30, 1899, at \$1,200.

Expert, corn kitchen—Appointed January 1 to August 31, 1900, at \$1,800.

Date of retirement, August 31, 1900.

Finney, R. Gordon:

Stenographer, appointed June 1 to December 31, 1899, at \$900.

Classification clerk—

Appointed January 1 to June 30, 1900, at \$1,500.

July 1 to August 15, 1900, at \$1,200.

Date of retirement, August 15, 1900.

Halley, William:

Superintendent warehouse, appointed June 5, 1899, to January 14, 1900, at \$1,080.

Foreman of installation, appointed January 15, 1900, to January 15, 1901, at \$1,800.

Date of retirement, January 15, 1901.

Shepperd, J. H., expert in grains:

Appointed June 15 to August 14, 1899, at \$1,500.

Date of retirement, August 14, 1899.

Doane, C. F., expert in grains:

Appointed June 15 to August 15, 1899, at \$1,500.

Date of retirement, August 15, 1899.

Dunlap, H. M., expert in horticulture:

Appointed July 1, 1899, to February 28, 1900, at \$1,500.

March 1 to August 15, 1900, at \$1,980.

Date of retirement, August 15, 1900.

Davis, A. D.:

Skilled workman—

Appointed July 15 to September 30, 1899, at \$600.

October 1, 1899, to January 14, 1900, at \$720.

Assistant foreman of installation—

Appointed January 15 to August 15, 1900, at \$1,200.

Date of retirement, August 15, 1900.

Gardner, H., expert in wines:

Appointed July 15 to September 14, 1899, at \$1,500.

Date of retirement, September 14, 1899.

Sparks, A. W.:

Draftsman, appointed October 16, 1899, to January 31, 1900, at \$1,080.

Installation expert, appointed February 1 to April 30, 1900, at \$4.50 a day.

Clerk, appointed November 12 to December 25, 1900, at \$900.

Date of retirement, December 25, 1900.

Farwell, E. S., expert in agriculture:

Appointed September 15 to November 30, 1899, at \$1,500.

Date of retirement, November 30, 1899.

Geddes, B. P., laborer:

Appointed October 4, 1899, to January 8, 1900, at \$480.

Henderson, Alice, stenographer:

Appointed September 18, 1899, to January 28, 1900, at \$720.

Morrison, James, freight clerk:

Appointed December 1, 1899, to January 31, 1900, at \$900.

Woodell, M. A., stenographer:

Appointed November 4, 1899, to January 15, 1900, at \$720.

Date of retirement, January 15, 1900.

Haddock, F. R., clerk:

Appointed December 1, 1899, to January 31, 1900, at \$900.

Date of retirement, January 31, 1900.

Carr, C. E., expert, corn kitchen:

Appointed February 1 to May 31, 1900, at \$2,400.

Date of retirement, May 31, 1900.

McDonald, J. M., superintendent agricultural implement annex:

Appointed February 1 to December 15, 1900, at \$1,800.

Date of retirement, December 15, 1900.

Loehler, Gustave, cabinetmaker:

Appointed February 1 to April 30, 1900, at \$4 a day.

Date of retirement, April 30, 1900.

Berg, Louis, cabinetmaker:

Appointed February 1 to April 30, 1900, at \$4 a day.

Date of retirement, April 30, 1900.

Massey, Robert, waiter, corn kitchen:

Appointed February 15, 1900, at \$600.

Schulte, J. I., expert in agriculture:

Appointed March 1 to December 25, 1900, at \$1,600.

Date of retirement, December 25, 1900.

Weiss, Henry, head chef, corn kitchen:

Appointed March 1 to September 15, 1900, at \$1,200.

Date of retirement, September 15, 1900.

Alix, Elizabeth, waiter, corn kitchen:

Appointed April 1 to November 15, 1900, at \$480.

Date of retirement, November 15, 1900.

Moody, Agnes, cook, corn kitchen:

Appointed April 1 to September 30, 1900, at \$480; October 1 to November 15, 1900, at \$720.

Date of retirement, November 15, 1900.

Chodat, L. jr.:

Waiter, corn kitchen, appointed April 15 to May 15, 1900, at \$540.

Manager, corn kitchen, appointed May 16 to October 30, 1900, at \$900.

Date of retirement, October 30, 1900.

Weill, Maurice, cook, corn kitchen:

Appointed April 15 to November 15, 1900, at \$780.

Date of retirement, November 15, 1900.

Schirmer, Arthur, skilled workman:

Appointed June 1 to July 31, 1900, at \$600; August 1 to November —, 1900, at \$720.

Date of retirement, Nov. 1, 1900.

Deering, J. B.:

Skilled workman, appointed June 1 to July 31, 1900, at \$600.

Laborer, appointed August 1, 1900, at \$480.

Date of retirement, ———.

Harvey, John, laborer:

Appointed July 1 to November 12, 1900, at \$480.

Date of retirement, November 12, 1900.

Schultz, L. F., laborer:

Appointed July 1 to November 12, 1900, at \$480.

Date of retirement, November 12, 1900.

Alvord, H. E., expert in charge of animal industry:

Appointed August 1 to September 30, 1900, at \$3,960.

Date of retirement, September 30, 1900.

Walz, F. J., expert in charge Weather Bureau exhibit:

Appointed August 1 to December 15, 1900, at \$2,900.

Date of retirement, December 15, 1900.

Wiley, H. W., expert in charge of wines, liquors, etc.:

Appointed August 1 to August 31, 1900, at \$3,960.

Date of retirement August 31, 1900.

Johnson, E. G., expert, Weather Bureau exhibit:

Appointed August 1 to October 30, 1900, at \$2,400; November 1 to November 15, 1900, at \$1,400.

Date of retirement, November 15, 1900.

Brackett, G. B., expert, in charge of horticulture:

Appointed August 1 to November 8, 1900, at \$3,600.

Date of retirement, November 8, 1900.

Fitzpatrick, H. L., skilled laborer:

Appointed August 1 to November 6, 1900, at \$720.

Date of retirement, November 6, 1900.

Woods, P. S., laborer:

Appointed ——— to October 15, 1900, at \$480.

Date of retirement, October 15, 1900.

Baldwin, C., stenographer:

Appointed ——— to November 30, 1900, at \$780.

Date of retirement, November 30, 1900.

Bango, Paul L., clerk:

Appointed November 14 to December 14, 1900, at \$720.

Date of retirement, December 14, 1900.



F-1. BIRD'S-EYE VIEW OF AGRICULTURAL FAÇADE FROM GALLERY, LOOKING WEST.



F-2. MAIN PORTAL OF AGRICULTURAL FAÇADE AND MAIN TRANSVERSE AISLE, LOOKING NORTHWEST.

LETTER OF TRANSMITTAL.

WASHINGTON, D. C., *January 31, 1901.*

HON. FERDINAND W. PECK,

*Commissioner-General of the United States
to the Paris Exposition of 1900.*

SIR: In pursuance of your instructions, I herewith transmit my report as director of agriculture in charge of the exhibits in Groups VII, VIII, and X, at the Paris Exposition of 1900.

The exhibits relating to my department were installed in five locations: In the main palace of agriculture, Champ de Mars; in the United States annex to the palace of agriculture, on Avenue Suffren, in the marine annex, so-called; in the palace of horticulture, on the right bank of the Seine, and at Vincennes; the various allotments of space footing up a total of 58,282 square feet. The exhibits in Groups VII and X, which referred to agriculture and food products, covered a very wide range of raw products of the soil and the manufactured products of agriculture, including machinery and appliances for their production or manipulation, either in the raw state or as food, as well as technical displays illustrating the theory and practice of agriculture. The exhibits in Group VIII related to horticulture, though the major portion of the display was made to emphasize the importance and value of our fresh fruits in relation to our European exports.

As the work of collection and preparation of exhibits was under the law placed in charge of the Secretary of Agriculture, I was called upon to fill a dual position as representative of the Secretary of Agriculture and as director of agriculture for the Commissioner-General.

In the work of collection and preparation the valuable aid of experts of the United States Department of Agriculture was made available through the heads of several divisions of the Department, who, with their assistants, as far as required, were designated by the Secretary to cooperate. The assignments thus made were as follows:

Meat and dairy industries: D. E. Salmon, Chief of the Bureau of Animal Industry, assisted by H. E. Alvord, dairy expert.

Bee keeping and entomology: L. O. Howard, chief entomologist, assisted by Mr. Frank Benton and others.

The raw cereals: B. T. Galloway, chief of the division of vegetable physiology and pathology, assisted by M. A. Carleton, wheat expert, Mr. A. F. Woods, and Mr. P. H. Dorsett.

Wines, whiskies, beers, sugars, and the exhibit of fertilizers: H. W. Wiley, chief chemist.

Leaf tobacco exhibits: Milton Whitney, soils division, assisted by Mr. Marcus L. Floyd.

Grasses and forage plants and exhibits illustrating the food of animals: Mr. F. Lamson-Scribner, assisted by Mr. F. A. Williams.

Fresh and dried and preserved fruits, nuts, etc., including seedsmen's exhibits: G. B. Brackett, pomologist, assisted by W. A. Taylor, assistant pomologist.

Collection of lint cottons: John Hyde, statistician.

The weather bureau display: Willis L. Moore, Chief of the United States Weather Bureau, assisted by Mr. Charles F. Marvin.

The experiment station exhibit: A. C. True, on behalf of the Department of Agriculture, and a member of a special committee appointed by the Association of Agricultural Experiment Stations.

The collection of the wool exhibits was assigned to J. R. Dodge, former statistician of the Department of Agriculture, and a leading authority on sheep husbandry.

The collection of all other classes of material was placed in charge of the Director of Agriculture for the Commissioner-General. In the collection of the cereal and milling products he was assisted by Mr. B. W. Snow, and in exploiting the fish foods, Tarleton H. Bean, director of fisheries and forestry, rendered valuable service.

One other division of the Department of Agriculture was represented in the assignments, for the collection of miscellaneous vegetable products proper, pharmaceutical products, extracts, tanning material, etc., but no exhibits in these classes were installed in Paris.

As my report, which follows, deals with every phase of the work from its beginning in December, 1898, down to the close of the Exposition, I need only make the general statement here that whatever was accomplished in Paris for American agriculture, and the industries growing out of agriculture, was the direct result of the intelligent effort and the faithful service and unremitting endeavor on the part of all who were associated with the work. It would be invidious, however, to honor one person above another for the manner in which their special work was accomplished where all did so well.

Before closing, however, I wish to express to you my hearty appreciation of your sympathy and of your assistance in the carrying out of my difficult work, and to thank you for your confidence, so often expressed, as well as for your many kindnesses to me and those under me in my department. To Hon. James Wilson, the Secretary of Agriculture, also, I desire to express my thanks for his many kindnesses, as well as evidences of confidence and esteem.

I wish also to make sincere acknowledgments to Mr. F. J. V. Skiff, director in chief of exhibit departments, for his support, encourage-

ment, and wise counsels in many trying situations and difficulties, and with him to my colleagues on the American commission for their cooperation in many ways during the long period of our association together.

I wish especially to acknowledge the valuable aid rendered me, and the Commission, by James I. Farmer, the Assistant Director of Agriculture, and to recognize his hearty support and his enthusiasm at all times. I wish to thank also the experts of the United States Department of Agriculture, and their assistants, whose names appear on other pages, for their active and earnest cooperation, and particularly those who went with us to Paris in charge of special exhibits, as well as all others who assisted in the work of exploitation and installation. I wish also to thank the members of my immediate staff of assistants for the faithful manner in which they discharged the duties which fell to them at all times and under adverse conditions, especially Messrs. Edward S. Farwell, John M. McDonald, Jasper A. Wilson, John I. Schulte, R. Gordon Finney, A. W. Sparks, and William Halley, not forgetting P. P. Flournoy, who, in the earlier months of our work, rendered such efficient service as the architect of our case construction.

To the United States jurors, who served in my department, a word in appreciation of their efforts is also due, for through their intelligent understanding of the exhibit proposition in my department it was possible for Groups VII, VIII, and X at the Paris Exposition of 1900 to carry off a record of awards second to none.

Respectfully submitted.

CHAS. RICHARDS DODGE,
Director of Agriculture.



F-3. SECTION OF AGRICULTURAL FAÇADE, SHOWING ARRANGEMENT OF PIER CASES IN THE ARCHES.

REPORT OF THE DEPARTMENT OF AGRICULTURE.

INTRODUCTION.

It has been said that agriculture is the foundation of all industrial prosperity. It has also been shown that the highest degree of agricultural prosperity is found in those communities where both farms and factories abound, proving that agriculture and the manufacturing industries are dependent upon each other.

In all countries and in all ages, even going back to prehistoric times, there have been but two human wants that were absolute necessities—food and clothing—of these two food being the more vital and absolute. In the earliest ages, when man was but little more than an animal, his food was the flesh of wild beasts, or derived from wild vegetable growths, his clothing the skins of the animals destroyed for food. Then began the first attempts at progress, faint glimmerings of a rude civilization, which should supplant the dependent animal man by the thinking and producing human being. There was an effort toward discrimination in the selection of foods, and in time the first attempts were made to reproduce by human means certain more desirable forms of vegetable growths. Thus agriculture had its beginning. With the discovery of fire, foods began to be rudely cooked. It was also discovered that the fibrous plants could be prepared and roughly woven into clothing better adapted than animal skins to the different conditions of life, and some of these plants were cultivated; so that in the earliest civilizations of which the world has record we find a rude agriculture, the coarse preparation of food products, a crude textile industry, and swiftly following in the footsteps of these the manufacture of pottery and of implements; the latter first of stone, then of bronze, then of iron. All to the end of feeding and clothing the human body, and for protection from the elements.

And so to-day the larger part of the wealth of any country, the larger proportion of human effort bestowed upon the world's industries, relates in some way, directly or indirectly, to our first two necessities, food and the clothing of the body, including protection from the elements or the construction of habitations.

The story of the progress of agricultural development in the United States is the story of our national progress, for the early settler, whether upon the bleak shores of Massachusetts Bay in Pilgrim times

or upon the far western prairie in more modern times, has literally reared his home out of the rocks and soil, and while sustaining himself and his family has become the pioneer of all industries.

It was a fitting recognition of the importance of agriculture and the allied food industries at the Paris Exposition of 1900 that nearly 60,000 square feet of space was allotted for the exhibits of agriculture, horticulture, and food products, though twice this area could readily have been utilized. In the chapters that follow I have endeavored to show how this vast space was covered with exhibits representing these most important industries in our national economy. In the remaining pages of this introduction it is proper to explain briefly the scope of these industries as factors in the general prosperity of the United States and particularly in relation to export trade.

No country has ever had such an agricultural surplus as the United States of America. The countries of the world, as a rule, have excess of a few products only in years of large yields and a deficiency of some in small crop yields. By reason of special adaptation of climate and soil some product may be always in excess and its production a permanent industry. a cash crop, made the basis of foreign exchanges, as cotton in this country, cattle and hides on the South American pampas, sugar in Brazil, and tea in China.

During the last twenty years continental Europe has had a surplus of beet sugar, with a few other products of the soil to spare occasionally, and a constant or occasional deficiency of many food products. This country, as a world exception, has usually a surplus of nearly everything yielded by its generous soils. And the main object of its agricultural exhibit at the Paris Exposition of 1900 was to show to the world this wealth of production, to obtain greater facility in distribution to supply the deficiencies of other countries and promote good living and happiness among other peoples.

The acreage, production, and value of a few of the main crops, the cereals, potatoes, and hay, for the year 1900, are thus estimated by the United States Department of Agriculture:

Products.	Acres.	Bushels.	Value per bushel.	Total value.
Corn	83, 320, 872	2, 105, 102, 516	\$0. 357	\$751, 220, 034
Wheat	42, 495, 385	522, 229, 505	. 619	323, 515, 177
Oats	27, 364, 795	809, 125, 989	. 258	206, 669, 233
Barley	2, 894, 282	58, 925, 833	. 408	24, 075, 271
Rye	1, 591, 362	23, 995, 927	. 512	12, 295, 417
Buckwheat	637, 930	9, 566, 966	. 558	5, 341, 413
Potatoes	2, 611, 054	210, 926, 897	. 431	90, 811, 167
Hay	39, 132, 890	50, 110, 906	. 0889	445, 538, 870
Total.....	220, 048, 570	3, 789, 984, 539	.....	1, 868, 466, 582

Cotton requires about 25,000,000 acres, fruits, vegetables, sugar beets, tobacco, flax, hemp, and other minor products occupying a considerable further area, altogether utilizing not quite half of the nearly

700,000,000 acres in farms, which do not occupy much more than one-third of the national area, not inclusive of the Philippines and other colonial possessions. As the cultivated area is not generally exploited by intensive methods, the advances of scientific agriculture may ultimately nearly double the rule of yield. Some of the farm areas in pasturage and forest may enlarge the breadth of cultivation and the public lands will be carved into millions more of farms, while irrigation will give heavy crops upon lands now yielding only range grasses. The possibilities of the extension of production by the use of unoccupied areas, by irrigation, fertilization, and intensive culture are simply enormous.

The value of present production, counting farm animals slaughtered, wool, poultry, dairy products, cereal grains, cotton, potatoes, hay, rice, tobacco, flax, hemp, fruit, garden vegetables, sugar cane, and sugar beets, and various minor products, but not including the forage of maize and straw of other cereals on about 180,000,000 acres, of great value in stock feeding and in the arts, will aggregate not far from \$5,000,000,000 per annum. But part of the corn and hay is duplicated in meat and dairy products which, however, come mainly from pasturage and green and dry forages not counted in the above aggregate, while most of the oats and much of the maize go to support horses and other working animals and for the betterment of the live stock of farms. But subtracting all duplication, the net product of all forms of rural husbandry, one year with another, will be near \$4,000,000,000. The decennial census has never given full or accurate returns of rural production, rarely including more than 60 per cent of it, mainly the products of arable culture.

There are several products which partake somewhat of the nature of a monopoly, from their peculiar advantages of soil, or climate, or other circumstances favorable to extensive culture. Cotton has had a century of development since the invention of Whitney's gin and, except the inferior staple of India and the larger fiber of Egypt, controls the market. Of something like 13,000,000 bales required this year for the world's spindles, 10,000,000 bales of American (about 70 per cent of our production being exported) will be needed.

Maize is a crop native to North America, growing everywhere in the United States except in Alaska, its numerous varieties adapted to every phase of climate, and its average product is 2,000,000,000 bushels, its largest crop 10 per cent more. While it is mostly used for stock feeding, fattening of meat-producing animals, it is the basis of starch making, of glucose, and high wines. About 3 bushels per capita may be used for human food, its bread in numerous forms being used economically and largely in the South, extensively with meats in the West, and considerably in the East. Scores of dishes from soup to dessert, and from "roasting ears" in summer to pop corn in winter, give a maize menu of

wide variety. It would require much space for a bare enumeration of its uses. Besides food and liquors for man, it is the fattener of beasts, as grass is the flesh maker, and the source of butter and cheese in the form of ensilage in winter, as is pasturage in summer. Its leaves and stalks—corn fodder—is worth all the other “roughness” of the fields in giving breadth to a too narrow or concentrated animal ration. Even the pith of the stalk is a necessary concomitant of armor plating in shipbuilding, and factories are occupied in its production. It is the great American crop, protean in its uses, the foundation of many profitable industries, the source of wealth in the profitable employment of labor. This glance at the utilitarian prominence of maize gives only a faint suggestion of its economic value.

In wheat growing the United States stands first. Thirty years ago France led the world. Our product now ranges from 500,000,000 to 700,000,000 bushels and averages nearly 600,000,000 bushels. France produces about six-tenths as much and Russia about one-half as much. India and Argentina are the only producers of any considerable crops, the former about 230,000,000 bushels, 90 per cent or more needed at home, and the latter only once or twice reaching 100,000,000 bushels, two-thirds of which is a surplus if the yield is large. Argentina is therefore much the greater factor in exportation. Our production has increased very rapidly and now constitutes nearly a fourth of the world's product. Prophecies of decline in production have not been verified. The crop is larger and the surplus greater with every recurring decade. Thirty to 35 per cent has of late been exported. For a long time a fourth to a third of the annual crop has been exported as wheat or flour. We have usually supplied one-half of the deficiency of the United Kingdom. There can easily be an increase of area and also of rate of yield. It is now grown by extensive and cheapest methods without fertilization. Intensive culture with fertilizers should produce 1,000,000,000 bushels on the present area. An increase of price would immediately enlarge the area in cultivation.

The production of beef is on an extensive scale. About 6,000,000 beeves are received at the principal Western markets. At local markets in the East and on the Pacific coast, and on the farms in the South and elsewhere large numbers are slaughtered, together adding some millions to the Western market total. Within thirty years improvements in methods of feeding have reduced the age of ripe beeves fully a year. Formerly three to four years were required to raise and fatten a steer. Now two and a half years give equal weight and far better quality. Then there was little gain in flesh during winter; now the rule among successful cattlemen is to make growth continuous from calthood to killing. Exports have been increasing both in the live and dressed meat trade since the beginning of fat-cattle shipments, less than thirty years ago. The exports of cattle last year, inclusive of fresh and salt beef, were equivalent to about 1,200,000 average beeves.



F-4. GENERAL VIEW OF AGRICULTURAL SPACE, WITH NEAR VIEW OF DAIRY COURT AND BEE-KEEPING EXHIBITS, FROM THE ENTRESOL GALLERY, LOOKING EAST.

Mutton has been much improved in the same time. All the English mutton breeds are bred, and their blood greatly predominates in all the farming States, and they are also found in the range districts. In the country at large the mutton breeds, pure-bred and grades, constitute about half of the flocks.

In numbers of hogs the United States stands first among the countries of the world. The surplus exported in pork products surpasses the numbers slaughtered in most other countries. The animals slaughtered by Western pork packers is now about 22,000,000, by those of the East and Pacific coast about 6,000,000, and by farmers in the South, where there is no organized packing, and by farmers of other parts of the country probably 12,000,000, making a total annual killing of at least 40,000,000 hogs, of which an equivalent of 9,000,000 of the weight of Western packing was exported last year.

The exports of agricultural products in 1900 were greater than in any previous year and amounted to \$904,658,958, or 62.26 per cent of the total domestic exports, which were \$1,453,013,659. In 1899 the agricultural exports were \$782,133,405. Breadstuffs, live beeves, provisions, cotton, bread and meat, and clothing, the great necessities of the outer and inner man, constitute 57 per cent, or more than half, of the value of last year's exports. The cotton value was exceptionally large from the high price caused by deficient production, \$168,017,461 for 3,733,864 bales, while in 1899 only \$110,422,104 was received for 3,600,069 bales. But breadstuffs produced still more than cotton, or \$180,448,163. Fifty years ago cotton cut a very large figure in these exports, while the breadstuff item was a mere bagatelle. The total for provisions is \$140,051,937; of live cattle, \$24,861,262. The quantities and value of breadstuffs were as follows:

	Quantity.	Value.
Wheat.....bushels..	69,182,185	\$49,689,724
Flour.....barrels..	13,863,778	50,622,065
Corn.....bushels..	135,282,051	58,986,712
Corn meal.....barrels..	593,438	1,378,806
Oats.....bushels..	24,136,748	7,370,026
Oatmeals.....pounds..	33,426,629	1,286,526
Barley.....bushels..	10,992,721	5,117,018
Rye.....do.....	1,760,722	1,058,971
Rye flour.....barrels..	2,668	9,354
Buckwheat.....bushels..	397,109	235,363
Bread and biscuits.....pounds..	12,073,097	612,185

In addition table preparations valued at \$1,637,396 were exported; 84,856 tons of bran and other mill feed, \$295,825, and 16,765 tons of dried grains and malt sprouts, \$775,162.

Among the increasing exports are fruits and nuts, of which the value last year was \$5,979,544, of which \$1,087,293 was for dried apples and \$508,855 for apples. Oranges and prunes now are in full supply from domestic sources, and more are exported than imported. Last year the imports of plums and prunes were 120,791 pounds, the exports

11,211,973 pounds, the value of the former nearly 7 cents, of the latter about $6\frac{1}{3}$ cents. Of raisins nearly as many are exported as imported.

Cotton-seed oil is largely exported; last year 30,776,426 gallons, valued at \$10,413,237. Of cotton-seed cake 653,832,505 pounds were exported, valued at \$6,818,063; linseed cake, 325,065,626 pounds, valued at \$3,786,393.

The quantity and value of provisions exported in 1900 were as follows:

Article.	Quantity.	Value.	Article.	Quantity.	Value.
Beef:	<i>Pounds.</i>		Lard.....	<i>Pounds.</i>	
Fresh.....	245,374,684	\$21,912,234	Butter.....	465,077,385	\$31,335,144
Canned.....	32,768,641	3,227,087	Cheese.....	10,479,640	1,913,300
Salted.....	39,860,029	2,427,417	Oleomargarine.....	47,071,781	4,820,798
Tallow.....	74,356,591	3,751,550	Oleo butter.....	123,626,083	8,919,544
Bacon.....	354,553,926	27,821,662	Milk.....	3,009,424	300,211
Hams.....	153,172,966	16,228,084			955,826
Pork.....	120,449,202	8,000,306			

While the annual increase of population is about a million and a third, while wages are high, the people prosperous, with no diminution of consumptive powers, still the surplus is constantly growing in quantity and in proportion. The explanation of this increase in productive power is this: The increase of labor-saving machinery, its greater effectiveness and more general use, more systematic and scientific methods in every branch of agriculture, and therefore the avoidance of waste and advance in the practice of economy in all farm operations. For the present the aim is to obtain the largest production at the least cost by the extensive method of culture. When culture becomes more intensive and the aim to maintain and increase the fertility of the soil, the rates of yield will largely increase and presumably the profits of agriculture may also be increased. By either method the surplus will long be ample for the wants of other nations.

PRELIMINARY WORK.

In beginning the narrative of the work accomplished in the Department of Agriculture, Horticulture, and Food Products at the Paris Exposition of 1900, it will be necessary to go back to a date prior to the organization of the United States Commission, when the Secretary of Agriculture began to seriously consider the part that our agriculture would play in this great international competition, and to the time when I was first called into conference with him on the subject.

At that time, April, 1898, it was only known that a space of 18,000 square feet had been allotted the United States for the exhibits in three great groups devoted to the products of the soil and their manufactures, commodities representing over two-thirds of our total exports. It was already known that the framers of the law had considered placing the collection and preparation of the agricultural

material comprised in Groups VII, VIII, and X under the charge of the Secretary of Agriculture, hence his interest in the matter at that time.

Owing to the meager appropriations for the previous Exposition of 1889, and to the fact that a period of only a few weeks, instead of many months, was available in which to secure and prepare the necessary material for display, the exhibits of agriculture and alimentation at that Exposition were incomplete and disappointing. It was deemed essential, therefore, early to outline an exhibit scheme for the Exposition of 1900 that would present in the most comprehensive manner, considering the limited space at our disposal, the story of our agricultural resources, and the extent of our manufactures growing out of agriculture.

As a result of this early consideration of the subject, when I visited Paris with the Commissioner-General in September, 1898, the essential points of the exhibit scheme had been decided upon, and the scheme was practically agreed to by him upon broad lines before our return to the United States.

The prevailing idea was to bring together a collective exhibit, based upon a grouping of closely related industries, in order to work out an economic presentment, rather than to consider strictly groups and classes as laid down in the French official classification. It should be noted that while such a scheme is most advantageous to the producer of raw products, the farmer, who can secure no direct benefits from exhibiting his commodities, and who therefore should not be called upon to incur expense, the manufacturer is placed at a serious disadvantage, because it is to his interest to promote his individual business as largely as possible, for the direct returns that may come to him as a result of such a form of advertising. Through the efforts of the Commissioner-General during the visit to Paris, in 1898, it was possible to more than double the space previously allotted to the United States in Groups VII, VIII, and X, and to place it in four advantageous locations instead of one. The granting of ground space for our agricultural annex gave opportunity for a proper presentation of the agricultural-implement industry, which otherwise would only have had meager representation with the other great agricultural industries that contribute 70 per cent of our total exports, against one-half of 1 per cent, representing the exports of agricultural machinery. The original apportionment of 18,000 square feet was still further relieved by the allotment of space for a special building to be devoted to the United States Weather Bureau exhibit, while a subsequent gain of nearly 4,000 square feet was made by the granting of permission to erect an entresol gallery over a portion of the main space in the Palace of Agriculture. Later, 2,500 feet of space was secured to the United States in the Palace of Horticulture, this space being considerably

increased as late as February, 1900, through the special efforts of my department.

After my formal appointment as the representative of the Secretary of Agriculture, which was immediately followed by appointment to the position of director of agriculture for the Commissioner-General, in December, 1898, the work of promoting the exhibit in my department was entered upon with enthusiasm. With the increased space available for exhibit material proper for display in this Department it became possible to broaden the scheme of exploitation somewhat, to the end of giving the commercial exhibitor more individuality than would be possible with bare representation, while retaining the essential features of a collective exhibit. By this means the raw product and the prepared food made from it might be exhibited in such proximity as would show their relation to each other; uniformity in installation and in the manner of displaying exhibits would also be assured, with direct governmental control in the scope and conduct of the exhibit in its entirety. To make my meaning plainer, it may be stated that wheat and maize, as raw products, are classified in Group VII, while the manufactures from wheat and maize are classified in Group X, foods. The advantage of displaying the raw and manufactured products in sequence rather than upon spaces remote from each other is obvious.

It should be noted that while case space display, to which the purely commercial exhibitor is limited by such a system, may bring the exhibit almost into the category of museum arrangement, its individuality is never lost, and it may receive the same award as though spread over an area 20 feet square.

The scope of the exhibit scheme as a great object lesson was therefore enlarged upon in the manner outlined, two ulterior objects always being kept in view—first, to make a tremendous showing of the vastness and variety of our resources, as an entirety, and, secondly, to give opportunity for the purely commercial exhibitor to advertise his house and his products to the world as a business proposition.

It should be stated that a considerable number of bona fide applications for space had been received from commercial exhibitors, the larger number of whom had proposed exhibits that would occupy considerable areas, necessitating the expenditure of thousands of dollars of private funds for installation and maintenance. To many of these applicants an absolute collective exhibit proposition would have been followed by withdrawal of the application, and nonparticipation in the Exposition. It should further be noted that many of these applications from commercial exhibitors were made months before the passage of the law of July 1, 1898, and on this account the applicants were entitled to the fullest recognition possible, under any plan of exhibition that might be adopted.

An examination of these commercial applications for space revealed the fact that the exhibits they represented covered portions of but few of the twenty-two classes represented in Groups VII, VIII, and X, and to that extent they would have made a most meager as well as unrepresentative showing of our resources on the commercial side. In order to secure systematic and comprehensive representation in every class recognized in the three so-called agricultural groups, it became necessary before beginning the work of exploitation to formulate on paper an independent classification of the exhibit material that, when brought together in Paris, would fitly illustrate and carry out the scheme previously agreed upon, of a grouping of related industries collectively presented.

The French classification shows many inconsistencies in the arrangement of raw and manufactured products in the different classes, so much so that a particular product may sometimes be shown, not only in several classes, but in distinct groups. And a study of the French classification, as far as it relates to agriculture at least, reveals the fact that a mass of exhibits in the various classes installed in sequence according to the classification would, in its ensemble, present a chaotic jumble of dissimilar material which would prove neither attractive to the eye nor advantageous for study.

In the formulation of the working plan, or arrangement classification, as it more properly should be termed, four general divisions were considered: (1) The animal industries; (2) food substances of vegetable origin; (3) vegetable products not food, and (4) agricultural practice, experiment station work, and meteorological science. These divisions were again separated into sections—as, for example, under animal industries, were grouped together the fish foods, dairy products, meat products, and insect products, including the insects themselves, the special machinery and appliances employed in the various industries being shown in connection with the products, or presented through the medium of charts, diagrams, and photographs. The sections were still further divided into subsections, in which individual products were named in detail, the classification in its entirety forming almost a complete catalogue of the material that it was desirable, as far as possible, to secure.

The agricultural implement industry was omitted from this scheme for the reason that the agricultural machines were to be shown separately on regular space allotments in another building.

The details of the Weather Bureau exhibit were likewise not considered in the general scheme for the exhibits in Groups VII and X, although its space was indicated under division 4 of the plan. As this arrangement classification was the foundation of the subsequent work for the collection of material, it is presented as a contribution to the literature of Exposition exploitation.

ARRANGEMENT CLASSIFICATION—EXHIBITS IN GROUPS VII AND X.

DIVISION I.—ANIMAL INDUSTRIES.

SECTION I.—FISH PRODUCTS.

SUBSECTION A.—*Products of the fisheries prepared for food.*—(a) Dry salted or plain dried preparations, including whole and boneless codfish. (b) Smoked preparations, including halibut, herring, finnan haddie, etc. (c) Pickle or brine salted preparations, including mackerel, herring, cods' tongues and sounds, etc. (d) Preparations in spices, vinegar, etc., including sardines in mustard and tomatoes, mackerel soured and in mustard and tomato sauce, etc. (e) Preparations in oil, including American sardines. (f) Cooked preparations in cans, including mackerel, herring, salmon, etc.

SUBSECTION B.—*Shellfish, etc.*—(a) Canned lobsters, crabs, shrimp, etc. (b) Oysters, clams, clam juice, etc.

SUBSECTION C.—*Models and apparatus, fish casts, photographs, etc.*

SECTION II.—DAIRY PRODUCTS.

SUBSECTION A.—*Milk and cream.*—(a) Fresh milk as supplied to urban customers in a variety of packages; "guaranteed" and "modified" milk. (b) Fresh cream and milk; plain for local supply, and prepared for general export.

SUBSECTION B.—*Butter.*—(a) Fresh in prints, family packages: (1) The product of farm dairies, (2) the product of creameries. (b) In bulk for general export: (1) From farm dairies, (2) from creameries. (c) In packages prepared for export to hot countries.

SUBSECTION C.—*Cheese, standard American factory.*—(a) American factory, varied and fancy forms; special forms; sage cheese, cheese one year old or more. (b) Special or fancy forms peculiar to the United States; pineapple, American cream, D'Isigny, Club House, etc. (c) American made of foreign forms: Neufchatel, Brie, Limburger, Gruyere, Edam, and Gouda.

SUBSECTION D.—*Commercial forms of by-products of the dairy.*—Such as desiccated curd, Fara-curd, egg-ine, whey-champagne, wheyn, sugar of milk, etc.

SUBSECTION E.—*Accessories.*—New and valuable tools and appliances employed in the dairy industry.

SECTION III.—MEAT PRODUCTS.

SUBSECTION A.—*Fresh meats, etc.*—Shown in revolving plate-glass refrigerator.

SUBSECTION B.—*Preserved meats.*—(a) Salted meats. (b) Dried and smoked meats. (c) Canned meats and meat delicacies. (d) Soups and meal extracts.

SUBSECTION C.—*Poultry products.*—(a) Canned fowls. (b) Eggs and preparations. (c) Appliances of the poultry industry.

SUBSECTION D.—*Animal fats and oils.*—(a) Lard. (b) Edible oils and margarin products.

SUBSECTION E.—*Illustrations of meat inspection in United States.*—Instruments, tags, labels, etc.

SUBSECTION F.—*Implements and appliances of the meat industry.*

SECTION IV.—INSECT PRODUCTS AND ENTOMOLOGY.

SUBSECTION A.—*Apiculture.*—(a) Honey and wax; manufactures from honey and wax, entire or in part. (b) Hives, implements, etc. (extractors, smokers, queen cages, comb foundation machinery, etc.). (c) Live apiary exhibit.



F-5. GENERAL VIEW OF AGRICULTURAL SPACE, LOOKING SOUTH FROM ENTRESOL GALLERY.

SUBSECTION B.—*Sericulture*.—(a) Silkworms, cocoons, and raw silk. (b) Appliances relating to sericulture, etc.

SUBSECTION C.—*Other insect products*, if any.

SUBSECTION D.—*Exhibit of injurious insects arranged according to the crops which they affect*.—(a) Special series of cases of insects affecting the vine (peculiarly appropriate in view of the great viticultural interests of France). (b) Special exhibit relating to the San Jose scale (especially appropriate in view of the great interest which all European nations are taking in this insect). (c) Special exhibit illustrating the interrelations of injurious insects and their parasites and predatory insects (of especial value since the division has been investigating this phase of economic entomology rather extensively of late). (d) Special exhibit illustrating the international spread of insects by means of commerce, including cosmopolitan species, species which are just beginning a cosmopolitan career, and species indigenous to the United States—only the most important forms to be represented.

SUBSECTION E.—*Means of preventing ravages of injurious insects*. (a) Insecticide devices. (b) Insecticide mixtures. (c) Illustrative material, photographs, charts, etc., in portfolios.

DIVISION 2.—FOOD SUBSTANCES OF VEGETABLE ORIGIN.

SECTION V.—CEREALS.

SUBSECTION A.—*Wheat*.—(1) Twenty-five representative varieties, named in Mr. Carleton's list. (To be shown in large quantities commercially.) (2) Geographic distribution of varieties: (a) Red winter wheat belt (North Central States); (b) hard spring-wheat belt (northern States of the Plains); (c) hard winter-wheat belt (southern States of the Plains); (d) soft or semi-hard wheat belt (Middle Atlantic States); (e) Southern wheat belt (Southern States); (f) white-wheat belt (Pacific coast States); (g) irrigated wheat belt (Rocky Mountain and basin States). To be shown in two ways: (a) Specimen of the entire plant, representing each variety, against a panel background; (b) very small sample of the grain of each variety. (3) New varieties, hybrid or improved—specimens showing both. (a) The parent forms; (b) the offspring.

SUBSECTION B.—*Corn*.—(1) Representative varieties, exhibited in large quantities and commercially. (2) Geographic distribution of varieties: (a) Dent varieties; (b) flint varieties; (c) soft varieties; (d) pop varieties; (e) sugar varieties. Exhibited in two ways: (a) Specimen of the plant; (b) small sample of the grain. (3) New varieties, hybrids or improved—specimens showing. (a) The parent forms; (b) the offspring.

SUBSECTION C.—*Oats*.—(1) Ten representative varieties, exhibited in large quantities commercially. (2) Geographical distribution of varieties: (a) Panicked oats; (b) side oats; (c) naked oats. Exhibited in two ways: (a) Specimen of the entire plant of each variety, against a panel background; (b) small sample of the grain of each variety. (3) New varieties, hybrid or improved, exhibiting both. (a) The parent forms; (b) the offspring.

SUBSECTION D.—*Barley*.—(1) Representative varieties, shown in large quantities commercially. (2) Geographic distribution of varieties: (a) Six-rowed varieties; (b) four-rowed varieties; (1) with hulls; (2) naked grain; (c) two-rowed varieties; (1) with hulls; (2) naked grain. Exhibited in two ways: (a) Specimen of the entire plant of each variety, against a panel background; (b) small sample of the grain.

SUBSECTION E.—*Rye*.—(1) Representative varieties, exhibited in large quantities commercially. (2) Geographic distribution of varieties, exhibited in two ways: (a) Specimens of the entire plant; (b) small sample of the grain.

SUBSECTION F.—*Rice*.—(1) Representative varieties, in large quantities. (2) Geo-

graphic distribution of varieties; (a) specimens of the entire plant; (b) small sample of the grain.

SUBSECTION G.—*Millet*s.—(1) Representative varieties, exhibited in large quantities. (2) Geographic distribution of varieties: (a) Common millets; (b) German millets or Hungarian; (c) broom-corn millets; (d) barnyard millets; (e) pearl millet; (f) African millets. Exhibited in two ways: (a) Specimen of the entire plant; (b) small sample of the seed.

SUBSECTION H.—*Miscellaneous cereals*.—(1) Kaffir corn. Geographic distribution of varieties: (a) White varieties; (b) red varieties. (2) Jerusalem corn. Geographic distribution of varieties. (3) Rice corn. Geographic distribution. (4) Milo maize. Geographic distribution.

SECTION VI.—CEREAL PRODUCTS FROM MAIZE.

As it is desired to give prominence to maize, in addition to its many manufactures, it is proposed to bring together in one case a single example, or more, or everything manufactured from the maize plant.

SUBSECTION A.—*Food products from maize*.—(1) Preserved foods: (a) Canned corn, desiccated corn, etc.; (b) pop corn and products. (2) Products from milling processes: Breakfast food, etc., hominy, grits, corn meal, cerealine, pancake flour, maizina, etc. (3) Products from chemical processes: (a) Starches, pearl powder; confectioners, laundry, etc., flourine and corn flour; (b) dextrine and gluecose, (c) sugars; (d) feeds, gluten meal, chop feed, mixed feed, corn-oil cake, etc.; (e) a few sample bottles of products of fermentation and distillation.

SUBSECTION B.—*Miscellaneous products*.—(a) Soap, corn oil, rubber substitute, etc.; (b) cellulose in varied forms, smokeless powder, upholstery materials; (c) illustrations of use of products from the maize plant in artistic decoration.

SECTION VII.—CEREAL PRODUCTS (OTHER THAN FROM MAIZE).

SUBSECTION A.—*Mill products*.—(a) Wheat, various flours, shredded wheat, cracked wheat, gluten flours, and breakfast foods; (b) oats, oatmeal, rolled, cracked, and other preparations; (c) rye products; (d) barley products; (e) buckwheat flours and miscellaneous products; (f) rice flours and rice food preparations.

SUBSECTION B.—*Products from chemical processes*.—(a) Starches (1) used as foods; (2) used in the arts (included all starches); (b) foods from chemical and technical processes. (Various manufactures and preparations to be exhibited under trade names.)

SUBSECTION C.—Equipment and methods, chiefly illustrative matter in portfolios; (a) plans and photographs relating to mills and factories; (b) the same, illustrating operations in conducting cereal industries and chemical and technical processes.

SECTION VIII.—BAKERY PRODUCTS.

SUBSECTION A.—*Bread and biscuit*.—(a) Bread, leavened and unleavened, fancy breads, spiced breads, etc.; (b) compressed bread, sea biscuit, crackers, wafers, etc.

SUBSECTION B.—*Pastry of various kinds peculiar to this country*.—(a) Dried cakes, gingerbread; (b) Fancy cake, plum pudding, etc., sealed in tin or otherwise.

SUBSECTION C.—*Methods and appliances*.—(a) Apparatus connected with the baking industry; (b) models of bakeries, chiefly illustrative material, as charts, plans, photographs, etc., in portfolios.

SECTION IX.—VEGETABLES AND MISCELLANEOUS FIELD AND GARDEN CROPS.

SUBSECTION A.—*Vegetables, etc., fresh, in model, or preserved as specimens*.—(a) Roots and tubers; (b) legumes, pease, lentils, etc.; (c) miscellaneous vegetables.

SUBSECTION B.—*Methods and appliances of culture*.—(a) Special appliances; (b) charts, photographs, etc., illustrating culture.

SECTION X.—FODDER PLANTS FOR ANIMALS.

SUBSECTION A.—*Grasses and forage plants*.—(a) Grasses, etc., on panels, showing the entire plant; (b) the same baled, or loose in packages; (c) ensilage and similar prepared animal foods; (d) seeds used as foods for animals.

SUBSECTION B.—*Miscellaneous vegetable products used for feeding animals*.—(a) Oil cake; (b) prepared foods, in various forms, simple or in combination.

SUBSECTION C.—*Illustrative material*.—Such as drawings, photographs, etc., displayed in portfolios.

SECTION XI.—MISCELLANEOUS VEGETABLE FOOD PRODUCTS.

SUBSECTION A.—*Commercial preparations of vegetables, etc.*—(a) Desiccated vegetables (commercial); (b) canned vegetables; (c) pickles, chowchow, and similar products; (d) flours and like preparations from vegetables; (e) illustrations of the canning and preserving industries.

SUBSECTION B.—*Beverages*.—(a) Coffee and coffee substitutes; (b) tea; (c) cocoa: (1) raw products, (2) preparations; (d) aromatic drinks.

SUBSECTION C.—*Miscellaneous commercial vegetable products*.—(a) Sauces, relishes, condiments, and spices; (b) edible oils, salad dressing; (c) flavoring extracts.

SUBSECTION D.—*Equipment and methods, chiefly illustrative material in portfolios*.—(a) Pertaining to collection of supply of raw material; (b) factories and works; (c) appliances. (In cases of special interest small models will be admitted for exhibit.)

SECTION XII.—SUGARS, SIRUPS, AND CONFECTIONERY.

SUBSECTION A.—*Cane sugars*.—(a) Various exhibits of white, yellow, clarified, coffee, raw, and other cane sugars; (b) various cane sirups and molasses.

SUBSECTION B.—*Beet sugars*.—(a) Various exhibits of white, raw, and other beet sugars; (b) beet molasses.

SUBSECTION C.—*Maple sugars and molasses*.—(a) Crude lumps, granulated or powdered, and molded forms; (b) molasses, light, dark, and in special packages.

SUBSECTION D.—*Methods and appliances of the sugar industry from the commercial standpoint; plans of refineries, photographs, etc., illustrating processes, in portfolios*.

SUBSECTION E.—*Confectionery*.—This series will embrace a collective exhibit representing the products of a few leading manufacturers of candies.

SUBSECTION F.—*Candied fruits, etc.*—(a) Candied fruits, frosted or in crystallized sugar; (b) candied nuts.

SUBSECTION G.—*Illustrative material*, as photographs, etc.

SECTION XIV.—WINES, CHAMPAGNES, CIDERS, ETC.

SUBSECTION A.—*Wines*.—(a) Clarets; (b) sauternes; (c) hochs; (d) sherry, port, and sweet wines; (e) champagnes; (f) miscellaneous wines.

SUBSECTION B.—*Cider, perry, etc.*—(a) Cider and perry; (b) champagne cider; (c) vinegar.

SUBSECTION C.—*Methods and appliances of these industries*.—(a) Plans and photographs of works; (b) illustrations of processes and operations.

SECTION XV.—SPIRITUOUS AND MALT LIQUORS, ETC.

SUBSECTION A.—*Whiskies, brandies, high wines, etc.*—(a) Whiskies, various brands, blended, mixed, etc.; (b) brandies, various brands; (c) rum (made in United States); (d) gin (made in United States); (e) high wines, alcohol, etc.; (f) miscellaneous.

SUBSECTION B.—*Cordial liqueurs, brandied fruits, etc.*—(a) Cordials and liqueurs of American manufacture; (b) brandy fruits.

SUBSECTION C.—*Beers, etc.*—(a) Beers (leading American brewers); (b) ales; (c) porters, stouts, etc.; (d) malt extracts and preparations. (Exhibited as such with trade names.)

SUBSECTION D.—*Artificial mineral waters.*—(a) Natural or distilled; (b) chemically charged, or imitations.

SUBSECTION E.—*Methods and appliances of the liquor industries.*—(a) Illustrations of distilleries, breweries, etc.; (b) illustrations of processes and operations in connection with the industries.

DIVISION 3.—VEGETABLE PRODUCTS NOT FOODS.

SECTION XVI.—TEXTILE FIBERS.

SUBSECTION A.—*Wool, hair, etc. (necessarily grouped here.)*—(a) Merino wools, long wools, etc.; (b) hair and bristles; (c) feathers; (d) illustrative material in portfolios.

SUBSECTION B.—*Cotton.*—(a) Collection showing varieties and localities; (b) commercial collection, showing staple; (c) collection, open, for examination.

SUBSECTION C.—*Flax and hemp.*—(a) Flax straw and fiber, scutched and hackled; (b) hemp in stalk and fiber.

SUBSECTION D.—*Miscellaneous fibers.*—(a) Ramie; (b) cordage fibers; (c) experimental fibers not yet produced in commercial quantity; (d) brush and upholstery fibers; (e) cellulose and manufactures.

SUBSECTION E.—*Machinery, methods and equipment.*—(a) Machines for preparing cotton for market, with photographic illustrations pertaining to the industry; (b) machinery, models of retting tanks, etc., used in the flax and hemp industries; photographs of operations; (c) machinery and illustrative material pertaining to other fiber industries.

SECTION XVII.—RAW TOBACCOS.

SUBSECTION A.—*Leaf tobacco; specimens of varieties in cultivation.*—(a) Cigar leaf tobacco; (b) manufacturing tobacco (smoking and chewing); (c) bright yellow (cigarette and chewing) tobacco; (d) perique tobacco; (e) export tobaccos: (1) English type; (2) German type; (3) French type; (4) Swiss type; (5) Austrian type; (6) Italian type; (7) Spanish type; (8) African type.

SUBSECTION B.—*Manufactured products of the above tobaccos: Collective series of types to illustrate uses.*

SUBSECTION C.—*Tobacco culture, methods and appliances.*—(a) Typical tobacco soils; (b) models, maps, charts, etc., illustrating the tobacco industry; photographs illustrating operations and processes.

SECTION XVIII.—MISCELLANEOUS VEGETABLE PRODUCTS.

SUBSECTION A.—*Nonedible oils.*—(a) Stems, seeds, etc.; (b) oil products.

SUBSECTION B.—*Medical and pharmaceutical products, raw and prepared.*—(a) Barks and roots; (b) leaves; (c) seeds and fruits; (d) preparations.

SUBSECTION C.—*Dye plants and dyes (tannin plants and tannin).*—(a) Dyestuffs: (1) Raw products; (2) manufactures. (b) Tannin substances: (1) Raw products; (2) manufactures.

SUBSECTION D.—*Other substances and products (placed here in the French classification).*—(a) Hops.

SUBSECTION E.—*Equipment, methods and appliances.*—Chiefly illustrative material in portfolios.

SECTION XIX.—FERTILIZERS.

SUBSECTION A.—*Natural phosphates*.—Samples of phosphates: (a) South Carolina; (b) Florida; (c) Tennessee.

SUBSECTION B.—*Preparation of phosphates*.—(1) Fine-ground phosphates: (a) Pebble phosphates; (b) soft phosphates; (c) stratified phosphates. (2) Dissolved phosphates: (a) Acid rock; (b) superphosphates.

SUBSECTION C.—*Bones*.—(1) Ground raw bones. (2) Ground steamed bones. (3) Ground dissolved bones.

SUBSECTION D.—*Nitrogenous fertilizers*.—(1) Oil cakes, etc.: (a) Cotton-seed cakes; (b) linseed cakes; (c) castor-bean cakes; (d) maize germ cakes. (2) Dried blood and tankage: (a) Dried blood; (b) tankage; (c) abattoir scraps and refuse. (3) Horn, hoof, hair, and leather (giving here the various preparations).

SUBSECTION E.—*Miscellaneous fertilizers, fish offal, etc.*

SUBSECTION F.—*Methods and equipment*.—Chiefly in the form of illustrative material in portfolios.

DIVISION 4.—AGRICULTURAL PRACTICE AND EXPERIMENT STATION WORK.

SECTION XX.—AGRICULTURAL EXPERIMENT STATION EXHIBIT, ILLUSTRATING METHODS AND RESULTS.

SUBSECTION A.—*Collection of special devices for work, and illustrations of notable results (by subjects rather than by stations)*.—(a) Pertaining to climates, soils, and waters, (b) pertaining to crops, (c) pertaining to manuring and soil fertility, (d) pertaining to foods and animal production, (e) pertaining to veterinary science, (f) pertaining to dairying, (g) pertaining to botany, horticulture, etc.; (subsectional divisions, from a to g, are divided into (1) police duties, (2) natural resources and conditions, (3) demonstration experiments; and (4) original investigations; (h) pertaining to technology (other than dairying).

SUBSECTION B.—*Publications*.—(a) A complete set of the publications of the stations and Office of Experiment Stations, including books by station officers; (b) card index, station publications; (c) press bulletins and other means employed for dissemination of information.

SUBSECTION C.—*Cartographic and photographic illustrations*.—(a) Historical and statistical charts showing origin, growth, and present status of the experiment station movement in the United States (for display in portfolios); (b) a large collection of photographs showing buildings, equipment, fields, special details of work and results, etc. (for display in albums).

It will be seen that only the products recognized in Groups VII and X are considered in this scheme. The exhibits in Group VIII, Horticulture, were as early considered, however, notwithstanding that nothing definite was known concerning space, or regarding the manner in which fresh fruit displays would be made in Paris. Through the earnest cooperation of the Pomological Division of the United States Department of Agriculture, from the outset, it was possible as early as December, 1898, to present a novel scheme for bringing our fresh fruits to the attention of Europeans, and for advancing our export trade in this direction. The plans recommended by the experts of the Pomological Division provided for a continuous display and judicious distribution of specimens of both apples and oranges during the entire

period of the Exposition, an undertaking fraught with difficulties and not heretofore attempted at so great a distance from points of production, but believed to be entirely practicable under good management and with the necessary funds. The plan, in brief, considered the collection of fruits of the crop of 1899 at convenient cold-storage centers, to be held until a stated period, when they would be rushed across the ocean in refrigeration and immediately placed in a cold-storage warehouse in France, from which supplies might be drawn as desired. It was further planned, if the crop of 1900 should prove a fine one, that after midsummer the reserve in storage should be replaced with fruits of the new crop, with a wider range, to include pears, peaches, plums, etc. How well this scheme was carried out is shown in that part of the report relating to exhibits.

EXPLOITATION.

In the early months of 1899, my department having been effectively organized, with offices installed in one of the buildings of the Department of Agriculture in Washington, the real work of exploitation was begun. The most important preliminary work was the assignment of the block spaces to industries, carrying out the collective-exhibit idea, each space to represent a special group of products with its associated manufactures. This also involved the entire question of case construction, the placing of façades, designing, and arranging the entresol gallery for Groups VII and X, with other minor details.

Two distinct lines of work were now being carried on; namely, matters of installation relating to Paris, which came wholly under the jurisdiction of the Commissioner-General, and the collection and preparation of the products of agriculture, relating wholly to the United States, and placed by law under the immediate charge of the Secretary of Agriculture.

A work of such magnitude as the collection of the exhibit material enumerated in the classification scheme presented elsewhere in this report (the larger part of which must necessarily be commercial material, the remainder being the products of the farm) could only be accomplished through the efforts of many assistants working under one director, and particularly through the cooperation, on the agricultural side, of a corps of experts regularly occupied in the special industries to be exploited.

In consultation with the Secretary of Agriculture the assignments of the different groups of agricultural material were early agreed upon, after which (about May 1, 1899) eight experts, representing as many bureaus or divisions of the United States Department of Agriculture, were detailed by the Secretary of Agriculture to cooperate in the work of collection, with authority to call upon their assistants to aid in the work as far as necessary. As the details of this chapter of

Exposition effort have been fully reported upon in other portions of this work, it would only add the monotony of repetition to reproduce them here.

The purely commercial material, while it did not come strictly under the agricultural clause of the law, was nevertheless collected in part by the experts detailed by the Secretary of Agriculture, the office of the director of agriculture for the Commissioner-General securing a considerable portion of this class of exhibits, which represented some of our most important exports. It is hardly necessary to state more than the simple fact that most of the bona fide applications for space from commercial exhibitors were considered by the director personally, all of the correspondence emanating from his office. Nearly all of these applications were referred to the Washington office by the Commissioner-General a short time after the work of exploitation began in my department, some of them having been on file over a year. In round numbers the total space demanded in these applications approximated 100,000 square feet, while, as previously mentioned, the exhibit material proposed by them covered a very small proportion of the twenty-two classes represented in the three agricultural groups.

To carry out the exhibit scheme decided upon, as outlined in previous pages, and at the same time to satisfy applicants who demanded from 100 to 2,000 square feet individually, as the case might be, with a final allotment of 2 by 3 feet or 4 by 6 feet, in a glass case, necessitated not only large correspondence but diplomacy and tact as well, yet even these qualities in some instances availed nothing.

The exhibit value or quality of any exposition as a whole must necessarily depend upon the quality of the exhibit material displayed, and of the standing of the houses presenting it. It becomes important, therefore, if a high standard of general excellence is desired, to secure a preponderance of high-class exhibit material, without which high awards can not be obtained. It also follows that the greater the number of exhibitors assigned to a given space, within certain reasonable limits, the greater the number of awards that will be secured; while the individual exhibitor, as far as the jury is concerned, fares as well on a limited space as on the larger area. Another important consideration bearing upon exhibit value is the relation of material to installation.

When an exhibit is installed, for example, in the space of a glass show case 6 feet square and 8 feet high, as a rule the entire space will be filled with solid material, displayed simply though artistically. Give the same exhibitor 20 feet square of empty floor space and the larger part of his exhibit will oftentimes comprise decorative material, or elaborate effects in wood, plaster, and fabrics. In other words, it may be a \$5,000 installation for \$50 worth of products, the exhibit as a whole not always presented in the best taste.

All of these ideas were duly considered when the exhibit scheme for my department was being formulated, the deductions giving the *raison d'être* of the plan as finally adopted; and the results in practice proved that in limited space a higher exhibit value, in commercial material, is secured by the collective system, provided, always, that there is some opportunity for selection.

To the end of making the display in Groups VII and X an "exhibition of selection" as far as possible, rather than an exposition of chance, before any space applications had been considered lists of houses of the higher standing were made up, representing exhibit material which had not been offered, yet which it was important to secure to carry out the idea of a systematic and comprehensive showing of the resources of our country in the agricultural groups. Correspondence was then opened with these houses, necessitating not only the writing of many hundreds of original letters, but oftentimes many letters to the same firm, before their "applications for representation" were finally received, the latter being the phrase used in my department in lieu of "application for space"—a misleading title head under the collective exhibit system.

There are two methods by which a large space can be readily filled at the average exposition: First, by giving the space to a few large companies or firms and crowding out all others; second, by inviting exhibitors to make displays, with a promise that the Government will pay all of their expenses and return their exhibits afterwards in the same condition as received. Unfortunately, the work of exploitation on the commercial side in my department was rendered exceedingly difficult at times on account of the prevalence of the paternal government idea, and many desirable exhibits of prosperous houses were not secured in consequence, and many others, more patriotic, were prevented from making displays because, with their mills running night and day, they were unable to keep up with orders. A manager of one of these companies replied to the director's letter of solicitation that he had no time even to think about an exhibit, much less to prepare one. He was then informed that if he would simply ship a named quantity of packages of his two forms of food products, the Commission would do his thinking for him, after which his exhibit was readily secured, his total expenses for representation in Paris amounting to less than \$50.

The collection of purely agricultural material is a simpler matter, although success in securing fine exhibits depends upon preparing at the outset a carefully organized and systematized scheme for getting the proper samples from the farmers, to the end of making a representative showing in a given class, and upon persistent effort, backed with funds, to carefully carry out the scheme. While any number of commercial exhibitors might be secured if the Government paid all

expenses, it is true that not one farmer in three who is asked to contribute a few quarts each of three or four kinds of grain, or a pound or two of cotton, will take the trouble to fill the bags that are sent him free by post and to return them with the material to Washington without expense to himself. The collection of the agricultural material secured for exhibit in my department, therefore, was a great undertaking, as it involved the sending out of many thousands of circulars and letters to carefully selected lists of farmers known to the experts or to the department; and, in addition, the forwarding of return information blanks, thousands of cotton bags and United States mail sacks, followed by letters of explanation, reminders, and, finally, by appeals for the long promised contributions. And while the general collections were being obtained in this manner, the special material was being sought for and personally solicited on the farms by experts, who, during several months, devoted themselves to field work exclusively.

Between the Government collective idea pure and simple, where the farmer contributes a quart or two of grain which is exhibited in his name without expense to him, and the usual commercial exhibit system, where the manufacturer accepts empty floor space and assumes all the costs of making and presenting his exhibit, there is a dangerous middle ground. I refer particularly to expositions conducted under Government auspices, where, for example, under such a law as that governing the placing of exhibits in my department in the present Exposition both farm and commercial products are considered. Reference has previously been made to the ease with which the latter kind of exhibit material may be secured when the Government pays all expenses, even to the extent of covering 100,000 square feet, if sufficient funds are available. The dangerous middle ground is the throwing of purely commercial products, possibly manufactured by large and prosperous houses, into a collectivity which is collective only in degree. That is to say, collective as far as relieving the commercial exhibitor of any expense is concerned; but absolutely individual when the jury of awards is making its rounds, it being understood that a purely collective exhibit can only receive a single collective award. In explanation, it would be unjust discrimination against a plow manufacturer whose expenses for exhibiting might amount to \$1,000 to admit in the same department and group, without expense to the exhibitor and under the guise of a Government collective contribution, a churn or other dairy implement occupying space and made perhaps under a dozen different patents. Or it would be equally unjust to an exhibitor of cereal foods, who pays all expenses of exhibiting, to admit at Government expense, near him and as part of a collective exhibit, meat products supplied by a commercial house by purchase and entered for individual award.

A glance at the French classification reveals the fact that in many

of the classes exhibit material is considered which, if shown to any extent, would require very large areas of space, such as the plans and models of farm buildings, factories, and mill systems. Besides these, general plans, diagrams, and charts illustrative of many branches of rural economy are also considered. Wall space, always valuable, can only be made available by sacrificing space that might be occupied by solid exhibits; and exhibits "in the flat" soon become monotonous and uninteresting to the average exposition visitor.

It was therefore planned to illustrate the many subjects connected with rural economy by means of photographs, diagrams, and charts, reduced to a uniform size (22 by 28 inches), to be shown in portfolios placed upon racks in table cases constructed for the purpose. Not to impose unnecessary expense upon the exhibitor by requiring photographic enlargements up to the size given, it was allowable to mount several photographs upon one card, provided the regulation size was adhered to. By employing such a system it was deemed unimportant to provide wall space for exhibits in the flat any further than such space might be found to exist at the back of show cases installed against partitions or walls, after the exhibit material had been placed on the shelves.

Contracts were made, however, with photographic enlargement firms by which a uniform cost could be guaranteed to any exhibitors desiring to fully illustrate their business by means of photographic enlargements of factories and mills, or of groups of employees at work in the different departments of their establishments.

In exploiting the photographic side of the exhibits in the agricultural groups, special effort was made to secure a large series of photographs illustrating American landscape gardening, the laying out of parks, cemeteries, and private and public grounds in and near cities, or in country towns.

Having thus discussed in a general way the manner of securing exhibit material, the subject of cases and installation may be briefly touched upon before going into other details of the work.

A modified Government collective exhibit scheme having been decided upon, uniformity in case installation became a convenience if not a necessity. The French authorities had by this time given permission to erect an entresol gallery 18 feet wide over the rear and along the entire extent of the space set apart for Groups VII and X. This gave the department considerable additional floor space.

Owing to the intersection of two obligatory aisles the ground area was divided into four irregular plats of space, the entresol gallery making a fifth. To the first or southwestern plat was assigned the animal products, noted in Division I of the arrangement classification, elsewhere presented. To the second, or southeastern plat, was assigned the products noted in Division II, while the products named in Division

III were assigned to the northeastern plat and to the entresol gallery above it. The northwestern plat was set apart for the retrospective exhibit prepared by the Deering Harvester Company, of Chicago, while the space above it was devoted to the Agricultural Experiment Station and other exhibits in Division IV of the collective classification. Subsequent events modified this arrangement somewhat, the grain space being encroached upon by meat exhibits, while the vegetable food products in like manner encroached upon the space devoted to nonfood products.

Having determined the kind of exhibits that would be displayed upon the respective plats, the style and arrangement of cases were next considered. A calculation was carefully made of case space requirements, resulting in the adoption of a combined system of pavilion and alcove or wall cases as being the most economical utilization of floor space. Three immense iron trusses or roof supports, springing from the two front spaces, complicated matters somewhat, but it was possible in two instances to inclose them in sections of alcove construction, while the third was treated independently and a single case planned to surround and hide it. The space diagram was then plotted practically as the cases were finally installed, giving the equivalent of over 200 cases.

In designing the cases the effort was made to introduce the element of variety while preserving uniformity. Twelve styles of cases were adopted in the scheme, each being designated by a letter. Two general forms of case construction and design were adopted; cases with 18-inch bases, arranged with doors, affording storage room beneath, and full cases where the entire cubic contents, above a 5-inch base, was available for display purposes.

The experience of previous expositions having shown that ebonized woodwork sets off to advantage all agricultural products, as usually installed, white oak with a dull ebony finish was decided upon, the possibility of somber effects in shadow being avoided by a little gilding. All case measurements, linear, were based on a 3-foot unit, so that in length every case was a multiple of 3 feet, each unit forming a section. In assigning case space to exhibitors such a system was most advantageous, as allotments could be made in sections, from one upward. One section in an average alcove case 8 feet high with storage base, meant a clear exhibit space 3 feet wide, 2 feet deep, and about 6 feet high. The depth of alcove cases varied, however, being 12, 18, 24, and 36 inches, according to the kind of material to be displayed in them. Pavilion cases were of various measurements—2 by 6, 6 by 6, 2 by 9, 3 by 9, 4 by 9, 6 by 9, and 2 by 12, besides some special cases designed for the arches of the façade, in the measurements of which the 3-foot unit could not be considered. As to height, cases were 6, 6½, 7½, 8, 9, and 10 feet. Table cases, to be placed along the main aisle,

were designed with racks for exhibits of photographs, and these were 2 by 6 and 2 by 9, with a height of $3\frac{1}{2}$ feet.

When the main space was first plotted, the idea of surrounding it with a façade had not been seriously considered. Plans were subsequently submitted, however, by the department of decoration, for a façade system, the main defect of which was that it in no way related to or symbolized agriculture. This being objected to, a façade in the old Spanish mission style of architecture was suggested and finally adopted. It was found, however, that the measurements of the system of arches embodied in the plan were so utterly at variance with the scheme of case arrangement agreed upon and partly necessitated by the presence of the three enormous trusses on the space, that both façade and case arrangement had to be modified and harmonized, all of which caused vexatious delay at a time when the work on all lines should have been rushed. A pretty main-aisle scheme was evolved, however, by closing alternate arches of the façade with bases and cornices of plaster, against which it was proposed to place a series of cases 6 feet high, forming what was analogous to a succession of street show windows. These were subsequently designated as index cases, in which it was planned to display the special products belonging to the courts upon which they abutted. The entresol gallery plans were then modified to harmonize with the Spanish mission idea, forming an effective background to the exhibit as a whole. Every foot of space was therefore utilized, even that in the angles of the stairways being planned to receive cases for exhibits. The space under one stairway was used as the tool room of the space foreman, while that under the other stairway was occupied as the entrance to the wine cellar.

Special permission was given by the French authorities to maintain a cellar for the storage of the surplus wines and liquors required for uses of the jury, and for purposes of demonstration. This cellar was planned to occupy the entire space under the office of the director, and to be reached only by going through the office to a passageway under the gallery stairs.

After the designs for the case construction had been submitted by the architect, Mr. Parke P. Flournoy, the plans for a 4 by 6 pavilion case were sent to a large cabinet-making establishment, with a *carte blanche* order to build a single case as a sample. This case, when finished and set up in Washington, was carefully studied, both as to beauty of design and economy of construction, with the result that an improved design was evolved from it with more graceful lines and at a saving in cost of 25 per cent on a large contract. A feature was the absence of sash, the pilasters with 2-inch faces being rabbeted to receive the plate glass direct, this being held in place by ornamental mitered moldings. It should be stated that in actual practice, after the exhibits had been installed, it was found that when it was neces-

sary to open a case, a plate of glass could be removed quickly and safely by those who knew how to do it, while the case at other times was more secure, because there were no locks to be tampered with. Beyond certain limits, however, this form of construction would not be advisable, owing to the danger from handling large plates of glass in opening the cases.

The contract for building the series of case construction required for the agricultural groups, for the horticultural exhibit, and the counters for the corn kitchen, was awarded to J. C. Knipp & Bro., of Baltimore, who completed the work in about two and one-half months. In illustration of the economy of space resulting from the employment of the alcove system of case installation, it may be stated that the plate-glass frontage of the cases built under this contract for Groups VII and X, if stretched out in a straight line, would extend four-fifths of a mile.

The case construction required for the horticultural exhibit differed in part from that to be employed in the food section. A series of pavilion cases with low bases, measuring 2 by 8 feet and about 6 feet in height, were provided for the exhibits of seeds and for a collection of fruit models. The stands for the display of fresh fruits, however, were simple inclosed bases with doors, affording storage, above which was arranged a series of low steps, the risers being faced with plate-glass mirrors. The color scheme finish adopted for the horticultural cases was a dull forest green stain upon white oak, rubbed down. As an experiment it proved a most gratifying success, and I recommend it for horticultural exhibits, where case construction and display of fruits and living plants are combined, as being both harmonious and artistic.

The furniture and woodwork of the Weather Bureau exhibit was planned to be in natural oak as far as possible.

In planning for the installation of the agricultural implement annex, woodwork of cases and all interior finish, such as moldings, posts, etc., were required to be ebonized. Platforms were limited to 8 inches in height. Uniform railings, or guards, of plush-covered rope attached to wooden posts were made obligatory, and the Commissioner-General controlled the wall space above a line of 6 feet for flag decoration and for placing the shield signs, which, for the sake of uniformity, were to be painted by this department at the expense of the exhibitor.

In the matter of uniformity of signs, the same rule was applied to the exhibitors in the main space of Groups VII and X, all signs to be prepared by this department, and limited to a uniform size and style of lettering, the frames to be attached to the tops of the cases and to correspond with them in color and finish.

It will be seen, therefore, that in the work of exploitation three general results were to be attained: To make a collective display in

which the individuality of the commercial exhibitor would not be lost; to represent as far as possible or practicable the 22 classes in the three groups in order to cover the entire field of American agriculture and the food industries, and, lastly, to present throughout a uniform system of installation that should be simple and at the same time artistic and effective

THE ALLOTMENT OF SPACE.

The only absolute floor-space allotments made in my department were the space assignments to the manufacturers of agricultural implements in the annex to Groups VII and X. While it was early known that a gross space of about 15,000 square feet would be secured by the erection of the three-story building decided upon, detailed plans upon which to allot space were not secured until August, 1899, and these were subsequently changed. The reason for this was the inability of the Commissioner-General to secure the approval of any definite plans for the construction of the building by the French Exposition authorities. Plan after plan was submitted only to be returned with absurd modifications and changes which could not be accepted. And when, after my arrival in Paris in February, 1900, and the installation period was almost upon us, the building was inspected, it was discovered that entire exhibit spaces had been so modified since the allotments had been made that vexatious changes in installation were necessitated. I make these statements in justice to my department, and in extenuation of unintentional discourtesy to the two or three exhibitors interested, who, after having accepted certain allotments made in good faith, submitted to the changed conditions regretfully, though graciously.

Over 75,000 square feet of space was demanded for machinery exhibits of all kinds in my department, the larger proportion of these demands coming from the agricultural implement trade. Less than two-thirds of the gross space of 15,000 feet would be available for agricultural machinery after deducting the space occupied by stairways, aisles, etc., this being in the ratio of 1 to 7 for space demanded. In order to learn the wishes of every exhibitor and to know the nature of the proposed exhibit in every case, prior to the assigning of space, the following circular, signed by the director and approved by the Commissioner-General, was sent to each exhibitor on June 1, 1899:

The agricultural implement section of the American exhibit at the Paris Exposition of 1900 will be installed in the annex to the palace of agriculture, which will be erected by the United States Commission. The plans for the building have not yet been definitely approved by the French authorities, although it is hoped that such approval will be granted in a few days, with agreement to certain demands pending, which are absolutely essential for the proper installation of bulky machines.

I beg to impress upon you that the available space for agricultural machinery in the annex to the palace of agriculture is exceedingly limited, notwithstanding that the gross space amounts to over 33 per cent of the gross space allotted to agriculture, and that the large number of applications received will necessitate making the indi-

vidual allotments in such areas as will preclude any manufacturer from attempting to show more than leading types. In view of the very limited space at the disposal of the Commissioner-General for the purpose, and in order to secure the best results, will you please send me at your earliest opportunity a list of the machines you desire to show, named in the order of their importance, with a diagram of the actual floor space each machine will occupy, without regard to aisle space, the height of the machine also being given? A photograph or print of the machine, extracted from your catalogue, is also desired in each instance.

Several manufacturers have suggested the desirability of making a part of their exhibits by means of models. I will state that a pavilion case (with 2-foot base) occupying floor space 3 by 9 feet, and 8 feet high, with floor and one shelf (giving a total of 50 square feet of shelf space), which will be suitable for such a display, can be provided for about \$60, without glass. These cases would be uniform with the handsome ebonized oak cases in which the agricultural exhibits will be displayed in the palace of agriculture, and can be furnished at contract prices. Such case installation for models, if generally adopted, would not only add greatly to the attractiveness of the agricultural implement exhibit as a whole, but would enable a manufacturer, by means of a few full-sized machines of leading types, and models of the remainder, to exhibit practically an entire line. Your views regarding this suggestion are invited, with a definite statement as to your wishes.

I beg to call your attention to circular No. 2, relating to photographic exhibits. Every manufacturer should be represented by at least one portfolio. Please note particularly the second paragraph on the third page of the circular in relation to this matter. Portfolios of uniform size and appearance can be supplied at small cost.

A month or six weeks later a second circular was sent out to those applicants who had paid no attention to the first, so that the final allotments of floor space in the annex were not made until August. The details of these allotments are given in the chapters relating to the exhibits, where are presented the figures showing the actual space occupied by each exhibitor.

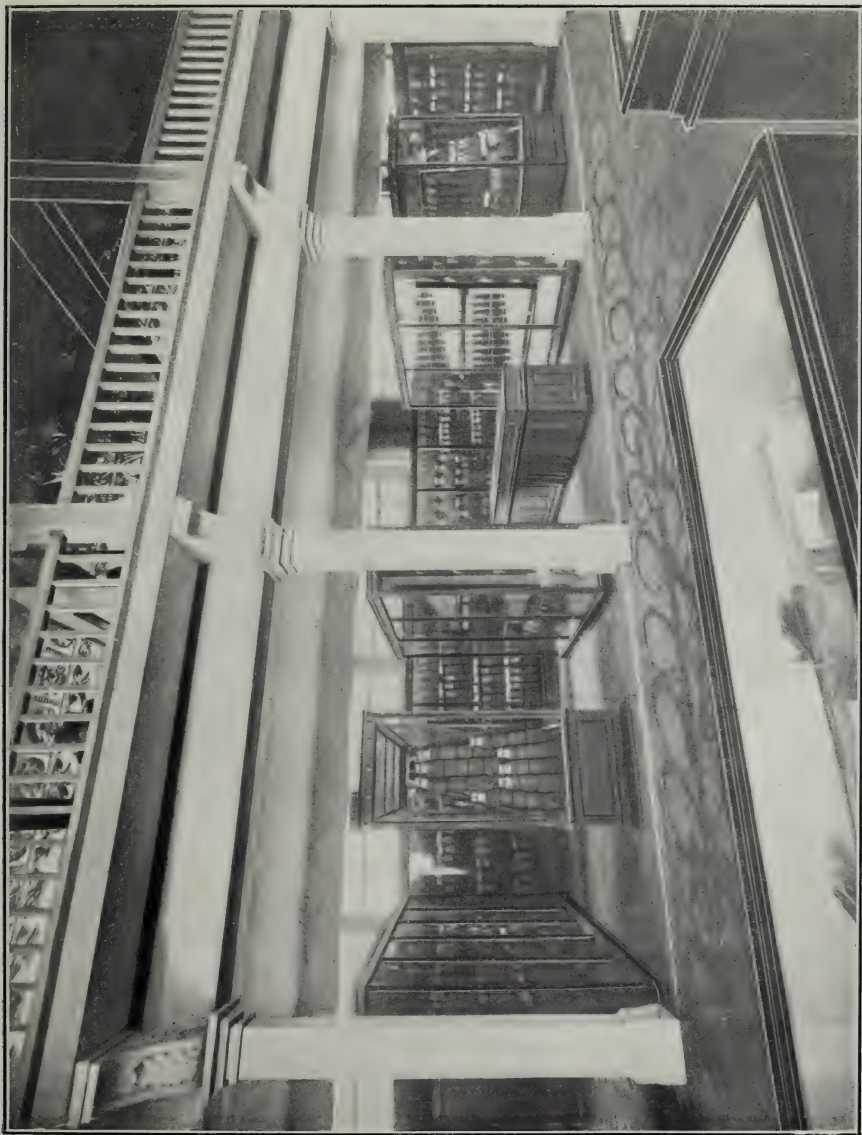
Mention should be made in this connection of the special allotment of about 1,000 square feet of space in the main palace for Groups VII and X to the Deering Harvester Company, for a retrospective exhibit illustrating the development of harvesting machinery. As the securing of the ground space for the agricultural machinery annex in the fall of 1898, when the Commissioner-General made his preliminary visit to Paris, was largely influenced by the promise of this magnificent exhibit of 100 models, the setting aside of space for the exhibit in the main palace was almost a condition when, in December, 1898, I took up the work of my department.

After the claims of the agricultural implement applicants had been satisfied, as far as space could be granted in the Champ de Mars, allotments to the extent of 8,218 feet were made in the Parc Vincennes section of the Exposition for two windmill exhibits by the Stover and the Aermotor companies; an exhibit by the Incubator and Brooder Company; a working exhibit by the Indo-Egyptian Cotton Compress Company, and the large and interesting exhibit made by the McCormick Harvesting Machine Company, the latter being located in the special building erected by the McCormick Company.

Space allotments in the agricultural annex were made in August, 1899. The following harvester manufacturers received assignments: The Deering Harvester Company, the McCormick Harvesting Machine Company, the Plano Manufacturing Company, and the Warder, Bushnell & Glessner Company, all of Chicago; D. M. Osborne & Co., Auburn, N. Y.; Walter A. Wood Machine Company, Hoosick Falls, N. Y.; Johnston Harvester Company, Batavia, N. Y.; Adriance, Platt & Co., Poughkeepsie, N. Y.; Aultman, Miller & Co., Akron, Ohio; Milwaukee Harvester Company, Milwaukee; the Whitman Agricultural Company, St. Louis. Manufacturers of hay presses, plows, harrows, and other implements and tools receiving assignments of space were as follows: Oliver Chilled Plow Works, South Bend, Ind.; Syracuse Chilled Plow Company, Syracuse, N. Y.; Deere & Co., Moline, Ill.; the Chattanooga Plow Company, Chattanooga, Tenn.; Johnson & Field Manufacturing Company, Racine, Wis.; H. M. Deal & Co., Bucyrus, Ohio, fanning mills and separators; Whitman & Barnes Company, Akron, Ohio; the Withington Cooley Company, Jackson, Mich., the Chicago Flexible Shaft Company, Chicago, small tools; F. W. Mann & Co., Milford, Mass., green bone cutters; the George Ertel Company, Quincy, Ill., incubators; P. W. Sharples, West Chester, Pa., and A. H. Reid & Co., Philadelphia, Pa., cream separators. It should be noted that other separator exhibits were installed in the main palace, Groups VII and X.

Acceptances were duly received from all these companies and firms. Later the Chattanooga Plow Company withdrew, the vacated space being given to the Stover Manufacturing Company. The Oliver Chilled Plow Company also withdrew, its space being divided between the Syracuse Plow Company and the Deere Company. The Oliver Chilled Plow Company again made application for a smaller space for an exhibit of models of their manufactures. By transferring the space set apart for the office of the superintendent of the agricultural annex to the vacant space in the stairway well, it was possible to grant the request of this company.

Subsequent to making the general allotments in the annex the McCormick Harvesting Machine Company applied for the privilege of exhibiting upon their main space five retrospective models illustrating the development of McCormick harvesting machines. As at this date the Deering Harvester Company had been allotted space for the general retrospective exhibit of harvesting machinery, permission was also granted the McCormick Company to install five models of machines of its own construction. Later application for additional space was made by the McCormick Company, and a space on the third floor of the agricultural annex, sufficient for the erection of two base pavilion cases, each to occupy 4 by 10 feet floor area, with necessary aisles, was allotted this company. In these two cases were afterwards installed 17 models which comprised the retrospective exhibit of machines manu-



F-7. THE COLLECTIVE EXHIBIT OF LEAF TOBACCO, DEPARTMENT OF AGRICULTURE.

factured, invented, or developed by the McCormick Harvesting Machine Company.

It should be noted also that S. L. Allen & Co., horticultural tools, and the Caldwell Lawn Mower Company were assigned space in the horticultural section, on the Seine.

The assignments of space in the palace of agriculture were made by two methods. The details of the case construction, planned to cover the entire space, had now been reduced to diagram. Contributors to purely collective exhibits were informed that their contributions would be appropriately displayed in mass, in such sections of cases as had been set apart for the special industry in which they were interested. They were informed that the arrangement of specimens would be by States as far as possible, but that the individuality of the contributor would be preserved only to the extent of the printed label, in English and French, attached to his exhibit. It need only be stated briefly that at this time the scheme of collective exhibits referred only to the products of the farm. All commercial material was to be individually installed, either in separate cases or in separate sections of combination cases, the exhibitors to pay the costs of case construction and purchase or rental of plate glass, with a percentage additional for expenses of installation, etc. And to avoid any complications in the payment of exhibitors' charges and Government charges for construction under the contract, the cases set apart for commercial exhibitors were paid for directly by the exhibitor, through an exhibitor's agent, or superintendent, not employed by the Commission, the correctness of the charge being attested by the director.

By this method it was possible for a company which may have maintained an exhibit on 500 square feet at the Chicago Exposition at a possible expense of \$4,000 or \$5,000 to be handsomely represented in Paris, in 1900, in a 4 by 6 pavilion case of ebonized oak, at a total cost of \$150, and with equal chance to secure proper awards. In all cases where correspondence with commercial exhibitors was conducted from the office of the director this matter was thoroughly understood and the benefits of the arrangement appreciated. There were misunderstandings, however, in some instances, where the correspondence was not wholly conducted in regular course, resulting in insistence that the exhibit was wholly collective as far as expense was concerned, but individual in relation to the amount of space for display and the advantages of jury consideration.

The allotments to commercial exhibitors therefore were made with the understanding that acceptance of space should also include the acceptance of the responsibility of payment of the cost of cases, of installation, and of such other outside charges as should not be paid by the Government, the total of these expenses being stated at the time the allotment was made.

These allotments varied from a space of 2 by 3 feet, 1 foot deep, to ten sections of a base alcove case, 3 feet deep and 7 feet high, equivalent to 3 by 30 by 6 feet actual exhibit space.

The allotments to the California exhibitors were made in a block to the California Paris Exposition Commission, though the individuality of every California commercial exhibitor was recognized by definite space, save in the installation of certain products which the California commission preferred to install collectively.

The bane of the Exposition director is the late withdrawal of applications and the throwing up of space allotments after all space is supposed to have been definitely accepted. The department of agriculture and food products was not wholly exempt from trouble of this nature, though no serious disadvantage accrued, because immediate steps were taken to fill the vacancies. The most serious disaffection was that of the large flour-milling companies which had accepted space, the withdrawals resulting in changing somewhat the exhibit material in the court devoted to milling products. Perhaps, on the whole, the innovations which resulted from reallootments gave a more pleasing variety to the final installation in the court, and, as is known, there was a positive gain in the number of medals later awarded, because of an increased number of exhibitors resulting from changes. The loss of but two exhibits was attributable to the Dreyfus affair, and as these related to collective or Government material, it was an advantage to the already overcrowded collective space.

ASSEMBLING AND PREPARATION OF EXHIBIT MATERIAL.

It was especially provided that the greater portion of the exhibit material in this department should be assembled in Washington, to be transported to Paris at Government expense, the commercial exhibitor to pay all transportation charges to Washington City. Agricultural products, such as the cereals, cotton, wool, etc., were to be forwarded to Washington without expense to the farmers who donated them.

The exceptions to the requirement that material should be shipped from Washington to Paris as a Government charge were as follows: All exhibits occupying absolute floor space and not considered in the collective scheme, such as agricultural implements, tools, incubators, cream separators, etc.; all exhibit material of any nature not received in Washington before the second sailing of the Government cruiser *Prairie* from the port of Baltimore; all perishable exhibits, such as fresh fruits, dairy products, fresh meats, etc., forwarded in cold storage and intended to be displayed at stated times during the Exposition on the occasion of international competitions.

Two warehouses were opened in Washington to facilitate the work of my department at this time: Warehouse No. 1, on Maryland ave-

nue, for the packing and storage of all exhibits that were ready to be forwarded to Paris; warehouse No. 2, on Thirteenth street, near the Department of Agriculture, for the expert inspection, selection, and preparation for exhibit of the purely agricultural material, which for the most part was received from the farmers, who contributed it in the crudest possible form.

Unprepared farm products are not exhibits in any sense of the word; no more so than a crude mass of building material heaped upon the ground could be called a finished structure. Even when placed in glass jars or other display receptacles such products have no value or interest unless accompanied by carefully prepared data, giving names of the varieties, locality of growth, and the identity of the producer; and, in addition, statements of yield, time of planting, and length of growing season placed upon the labels give increased importance. The real value of exhibits of this nature therefore depends largely upon the careful selection of samples and the manner in which they are prepared for exhibit. In the preparation of the agricultural material sent to Paris from the United States it may be stated, without fear of contradiction, that no such exhibits of the kind were ever before sent out of the United States to a foreign exposition. Naturally, in the work of preparation large numbers of glass jars were required, these having to be made to order in special sizes; wooden display boxes of original pattern, with glass fronts, and gray linen bags specially manufactured and dyed to a likeness in shade were also used to the extent of large orders. For the proper installation of the grasses and of grain and maize in the straw and ear many oak framed compo-board panels were required. The cotton and wool exhibits were not only prepared but arranged in the display boxes in which they were to be shown in Paris. In some instances dummy cases were set up in one of the rooms of the warehouse and the different exhibits of a special series temporarily installed before packing for Paris, in order that no mistake should be made in the style of installation decided upon.

In addition to the work going on in two warehouses, the tobacco exhibit was being prepared in another location, where very moist atmospheric conditions could be maintained and where the exhibit material could be carefully studied and selected from the mass of contributed specimens that had been secured. The wine and liquor exhibits were assembled in still another location, where the temperature could be kept at the proper point and where they would be safe from injury. The making of photographs from the many negatives selected to illustrate American agricultural methods was also being pushed, as well as the work of mounting these photographs by hundreds on the 22 by 28 regulation boards required. At this time our working force numbered over 50 people, including the agricultural experts and their assistants,

preparators, typewriters, carpenters, painters, packers, and laborers, while two printing offices were busy with the card labels.

While the work of preparing the agricultural exhibits was proceeding the commercial exhibit material was coming in rapidly, and as the larger part of the food products had been shipped to Washington in the ordinary commercial packages for domestic shipment—usually half-inch pine—nearly everything was required to be repacked in heavy cases bound with strap iron. The necessity of these extra cases was suggested by the recollection of the experiences of former Paris expositions, when exhibits in ordinary packing cases were seriously damaged in transit by the rough treatment they received.

The records of receipts of material for preparation, warehousing, packing, etc., were kept in three places—the receipts and transfers to the warehouses on the books of the shipping clerk, the complete story of every exhibit on a card catalogue or index maintained in the Washington office of the Commissioner-General, and the detailed data regarding the individual samples of agricultural material in the offices of the experts in charge of the different specialties. The latter information was drawn off as rapidly as possible upon printed forms designated as catalogue sheets, which when bound together in consecutive series formed the permanent Paris record of the exhibits in the different classes. There were four forms of these sheets, one each for commercial articles, agricultural products, experiment station and scientific material, and for the fresh fruit exhibits, each form being on a different color of paper.

It should be explained that the information given in the official catalogue to be distributed in Paris included only the name and address of the exhibitor, with a line of type briefly identifying the exhibit. The catalogue sheets referred to the individual specimens in the exhibit, with detailed descriptions of each, these sheets forming the basis of the printed labels, in French and English, which were to accompany the specimens.

While work on the exhibits was proceeding rapidly in Washington the display cases were being constructed in Baltimore, and as fast as finished and inspected were packed and transferred to the Baltimore warehouse for shipment to Paris. A considerable number of these cases were shipped by the first trip of the *Prairie* in December, so as to be on the Exposition grounds in ample season. As events proved, all of the material reached the shores of France before the spaces were ready to receive them.

The director of agriculture departed for Paris about the middle of January, leaving the Washington office in charge of the assistant director. A month later the office was formally closed and transferred to the Exposition. This finishes the narratives of the work of collection and preparation in the United States.

COST TO COMMERCIAL EXHIBITORS UNDER THE COLLECTIVE SCHEME.

The system has been fully explained under which commercial exhibits were received and installed collectively on small areas, while preserving the individuality of the exhibitor. It is proper at this point to show how the proportion of expense incident to the displaying of commercial exhibits beyond what might be called legitimate Government charges was assessed and collected.

In the first place, the Government could not receive and disburse the funds of private exhibitors in exploiting purely commercial displays; nor could any exhibitor afford to send a representative to Paris to install and care for a small case exhibit. A system was therefore devised which provided for the appointment of a competent agent or superintendent, outside of this department, who should represent the exhibitors as a whole, attend to all business involving expense in the matter of transportation, case construction, installation, and other items of charge the payment of which the Government was not called upon to assume, and look after their interests generally in the particular department concerned. A general trustee, acting for the collective commercial exhibitors in all departments, was also appointed to receive and disburse funds for these exhibitors, it being understood that they were to have the benefit of any contract rates that might be made by the Government, such as the cost of transportation, the building of cases, the rental of plate glass, etc. All items of expense to be charged to the exhibitors were to be viséed by the Director, both when the charge was made and when the bill was finally paid, in order that the exhibitor and the Government alike might be fully protected.

Under the system provided the largest expense was for case construction and rental of plate glass. The total expense to any one exhibitor, therefore, was regulated by the expense of the case, or part of the case, in which his products were installed, and as these varied greatly, from an actual floor space of 3 square feet to 50 square feet or more, the cases varying in height from 6 feet to 10 feet, the range was from \$13 (for a half section) upward to several hundred dollars. For a total of about \$31 an exhibit might be installed in a section of an alcove or combination plate-glass case, having a frontage of 3 feet, a mean depth of 2 feet and a height of 8 feet, the lower 2 feet, or closed base, affording storage space for surplus material for distribution. Or a larger and more important exhibit might be installed in an individual pavilion case (with aisles on four sides), measuring 4 by 6 feet, with a height of 8 feet, and also provided with a storage base, for \$158. In the latter form of case such exhibits as that of the American Cotton Oil Company, the Walter Baker Company, chocolate products; the American Cereal Company, Quaker oats, etc., or the Pillsburys, flour-milling products, were installed. These companies, for the sum named per case, were enabled to cover 24 square feet of

floor space with their exhibits and at the same time to secure all the advantages of a display that might be made to cover a vastly larger space, as under the system of absolute space allotment commonly followed at expositions. It should be remembered, however, that the total expenses of exhibiting under the latter system might range from \$1,500 upward, dependent upon the number of representatives or employees that were connected with the exhibit and the amount of demonstration carried on by them.

The exhibitors' superintendent in my department was Mr. Edward S. Farwell, of Boston, Mass., a gentleman who from long experience in the commercial world was eminently fitted for the position. Mr. Farwell fulfilled his many duties to the satisfaction of the commercial exhibitors, acting as their representative to the extent of adjusting all matters of expense, answering the questions of the public or giving information regarding the products exhibited, distributing such literature as had been placed in his hands, etc. And during the jury period he was able to render valuable assistance in the proper presentation of their products for expert examination.

Under the system outlined above, commercial exhibits were received and installed at a nominal expense to the exhibitors in each of the eight classes in Group X, Food Products, though only to a limited extent in the classes of Group VII, Agriculture, the displays in the latter group being largely Government collective exhibits, or those for which the United States had paid all of the expenses. It should be placed on record, however, that there were a number of displays in the agricultural group which should have been placed on precisely the same footing as the exhibits in the group devoted to food products, as they emanated from large commercial houses of standing and reputation. The law was partly responsible for this discrimination, as it was difficult to draw the line between a purely Government collective display, in which the exhibitor would derive very little, if any, direct advantage from contributing an exhibit and a purely commercial display put up as an advertisement by a pushing business house.

As illustrating the economical advantage to the commercial exhibitors who made displays in my department under the system adopted, I may state that while a sum not to exceed \$150,000 was appropriated to defray the usual Government charges in exploiting American agriculture, horticulture, and food products at the Paris Exposition, the total additional amount contributed by commercial exhibitors for transportation, case construction, superintendence, etc., under the collective scheme was only about \$13,000. While the director of this department has no means of knowing the total amount expended by the agricultural implement companies whose exhibits were installed on absolute space allotments and wholly at their own expense, he is safe in estimating this expense to have been not less than \$200,000 for the total of 25 exhibits, large and small, shown in the agricultural annex. Yet there

were important commercial establishments making displays under the collective scheme which received high awards that declined to assume even the cost of their own display cases, a matter of \$50 to \$75. On the contrary, many other commercial exhibitors expressed their fullest satisfaction in relation to the working of the scheme, in flattering testimonials regarding their treatment by the American Commission.

I should add, in conclusion, that with only trifling exceptions the material which made up the food products exhibit was turned over to the director at the close of the Exposition either for distribution to hospitals and charitable institutions or for sale for the benefit of the exhibitors' fund. It should be explained that the breakage of plate glass in transit and the increase in expenses over the amounts estimated, due in many instances to the exigency of getting exhibits to the space at any cost, at a time when the railways and the terminal companies were unable to properly fulfill their contracts, left a deficit in the exhibitors' fund.

I append a brief report submitted by the exhibitors' superintendent showing the manner in which assessments were made:

REPORT OF EDWARD S. FARWELL.

PARIS, FRANCE, *December, 1900.*

MR. CHARLES RICHARDS DODGE,

Director of Agriculture, United States Commission to Paris Exposition of 1900.

DEAR SIR: My special work as the exhibitors' agent and superintendent for Groups VII, VIII, and X was taken up about the middle of September, 1899, though for the first six weeks, while familiarizing myself with the system of installation adopted in the agricultural groups, I was temporarily attached to the United States Commission.

My first effort was to catalogue the commercial exhibit material, as shown by the applications and lists accompanying them, and to ascertain the location of floor space and form of case and portion of case to be occupied by the exhibit, as the installation scheme considered covering the entire area with exhibition cases of varied forms, though preserving on the whole a general uniformity of appearance. As fast as the exhibits were received and warehoused in Washington records were made showing the number and weight of packing boxes, in order that estimates might be made of the bulk of material in each exhibit to be forwarded to Paris later. A schedule showing contract prices for cases, shelving, rental of plate glass, preparation of signs, etc., was carefully worked out as a preliminary to computing the ratio of expense to each commercial exhibitor making a display under the collective or cooperative scheme.

From the mass of data thus secured the total of cost to the exhibitors was finally estimated, and a statement of the account sent to each, attested in every instance by the director of agriculture.

Payments were made to the exhibitors' trustee, Mr. C. I. Drake, and the money received was deposited in a common fund, to be disbursed only for the items charged against the exhibitors, as payments for these charges came due.

The display cases, of various shapes and sizes, were designed to afford the best accommodation for the products exhibited. Though preserving a general uniformity they were sufficiently varied to relieve the eye of monotony in their relation to aisle space and to the appearance of the exhibit as a whole. Some of the principal forms were as follows:

Pavilion cases were, in feet, 2 by 2, 4 by 6, 6 by 6, 3 by 9. The height of these

cases varied from 8 to 9 feet. Some had only 6-inch bases, others were provided with bases 2 feet in depth, in which were closets affording room for storage.

Arcade cases were, in size, 7 feet 4 inches by 2 feet. These cases were 6 feet 3 inches in height with bases 1 foot 10 inches deep. They were designed to stand in the arches of the façade.

Table cases were 2 feet in width and of varying lengths. They extended along the main aisle, their bases all containing cupboards or shelves for photographs and literature.

Alcove or wall cases were of various depths—1 foot, 1 foot 5 inches, 2 feet 8 inches, and 3 feet; but were uniformly divided into 3-foot sections. They were also of different lengths, according to locality. In height they varied from 6 feet 3 inches to 10 feet.

This system proved both economical and efficient, affording the exhibitors a large range of choice in location and price. An exhibitor could avail himself of any desired amount of accommodations for the products he wished to show, from a half section in one of the smallest wall cases to the entire control of one of the large pavilion cases, with its four plate-glass sides. The cost to the exhibitor, therefore, was governed by the amount of space occupied, the kind of case chosen, and the quantities of glass, shelving, etc., required, to which were added items judged necessary to cover the expense of transportation, handling, installation, jury presentation, and other incidentals.

Comparatively few of the exhibitors occupied entire cases, the majority being installed in larger or smaller portions, from one-half of a single section upward. To afford some idea of the range and character of the charges made to individual exhibitors, the following examples are noted:

An entire 4 by 6 foot pavilion case with a 2-foot base and the necessary shelving cost, complete, \$158.84, the items making up this amount being as follows:

Original cost of case from manufacturer	\$78. 50
Rental of plate glass (for sides), top glass, and shelving	34. 70
Transportation, installation, superintendence, and minor charges	45. 64
	<hr/>
	158. 84

A pavilion case of size 6 by 6 feet, with 6-inch base, etc., cost as follows:

Original cost from the manufacturer	\$98. 10
Rental of plate glass, top glass, and shelving	78. 00
Transportation, installation, superintendence, and minor charges	69. 10
	<hr/>
	245. 20

A pavilion case 2 by 9 feet cost as follows:

Original cost from manufacturer	\$94. 60
Rental plate glass, top glass, and shelving	30. 00
Transportation, installation, superintendence, and minor charges	51. 10
	<hr/>
	175. 70

A table (or aisle) case, as follows:

Original cost from manufacturer	\$47. 60
Glazing (top only)	2. 75
Transportation, installation, superintendence, and minor charges	22. 20
	<hr/>
	72. 55

An arcade case, say, 7 by 2 feet, as follows:

Original cost from manufacturer	\$48. 30
Rental plate glass and top glass	17. 00
Superintendence and other charges	44. 70
	<hr/>
	110. 00

The alcove cases, as before noted, were necessarily of different lengths, to suit the various locations for which they were intended; they were, however, divided into sections uniformly of 3 feet linear frontage; they also varied in depth from 10 inches to 3 feet. Some of these cases also were made with deep bases and some without. The cost of sections in these cases, of varying depth, ranged as follows: Unglazed, from manufacturer for \$14.67 to \$20.15; with glass shelving and other charges, \$26.30 to \$36.50.

This shows that in some instances an exhibitor could be placed (and many actually were so placed, whose exhibits required only a half section in a wall case) at a total expense to himself of about \$13, this charge covering his liability for the transportation of his product from Washington to Paris, its installation in assigned location, its care, presentation to the jury of awards, representation, etc.

There were in all 211 of these exhibition cases of all forms. Of these the United States Government occupied about 116 cases with purely collective exhibits representative of the entire Union, while the number taken by commercial exhibitors was about 95. The fact that some cases were mixed—that is, being partly Government and partly commercial—renders it difficult to make a more exact comparison. The commercial exhibitors paid in the aggregate for the accommodations afforded them the sum of \$13,097.42.

Very respectfully,

EDWARD S. FARWELL,

Superintendent of Collective Exhibits, Agriculture and Food Products.

THE WORK OF INSTALLATION AT THE EXPOSITION.

While the material relating to Groups VII, VIII, and X was early received in France, the general state of unpreparedness of the Exposition rendered it necessary that the great bulk of shipments should be held back for a time in Havre and Rouen, where they had been discharged by the *Prairie*. Case material for approximately one-fifth of the exhibit space was forwarded to Paris as soon as possible, however, and about February 20 the work of erecting cases in the Palace of Agriculture was begun. The façade surrounding the space was not fully completed at this time. Over vast areas of the great Exposition building—the superb Gallerie de Machines of the Exposition of 1889—little was to be seen but the unfloored earth, for no representative of another country had apparently put in an appearance, and only upon a small portion of the United States space had the flooring been laid. The manner of laying floors at a French Exposition is worthy of passing notice. The earth having been roughly leveled, 2 by 3 inch or 3 by 4 inch strips of pine or spruce scantling are laid down, presumably at fixed distances from one another, though in point of fact the rule of chance usually prevails. Upon these loose and untied strips of wood, second grade matched flooring lumber, practically one inch in thickness, was laid and afterwards nailed, little attention being paid to filling depressions or leveling surfaces. It was upon such billowy, vibrating floors that our cases were erected, though not without protest to the American contractors to whom the work had been sublet. It is almost needless to remark that these protests were of such an insistent nature that the trouble was in a measure remedied. The writer desires to urge, if such trifling details are deemed unimportant in a report of

this nature, the excuse that the long catalogue of petty but vexatious annoyances of which this was but the beginning is alone responsible for the fact that the agricultural section, as well as other sections of the American exhibits in Paris, were found in an unfinished condition on opening day. And what has been said of the United States can be said of every other country, including France and her nearest neighbors.

The work of erecting cases on the United States space in the palace of agriculture was begun about fifty days before the date set for the opening of the Exposition, with nearly half the exhibits on French soil at the time, while the remainder were on the ocean. Judging from the experience of former exhibitions, there appeared to be ample time in which to completely install both cases and exhibits. At this time the entresol gallery had not been erected, though the construction material was for the most part on the ground—literally on the ground—with the fact very apparent that no flooring could be laid either above or below upon which to erect the cases, covering nearly 8,000 square feet of space, until the main construction of the gallery had been accomplished. This part of my space was separated from the main space by one of the obligatory aisles controlled by the French Exposition authorities. Midway of my space a similar aisle crossed it at a right angle, this aisle leading into the center of the palace. Running through the first aisle was the railroad track which brought all freight into this portion of the Exposition. At first this was thought to be a fortunate circumstance, but a little later the truth was made very apparent that the agricultural space was to all intents and purposes the freight yard and discharging ground for a majority of the foreign sections of the agricultural groups. Both aisles were likewise main thoroughfares through this portion of the Exposition grounds, which in a very short time necessitated the extra expense and labor of erecting barricades around the four plots of space which these aisles bounded, as a means of protection, not only from injury, but from theft. The railway tracks, instead of being placed in the center of the aisle, had been laid so far to one side that expensive changes in the plans of the entresol gallery were necessitated, in order that freight cars could be run through the space without injuring the structure. A further complication arose from a blunder of the Exposition engineer who laid down for the entresol contractor the boundary line of the aisle, giving him measurements from the railway track, which had been laid 5 inches nearer the rear wall at one end of the space than at the other. As portions of the alcove case construction for this area had been planned to fill the entire space from the aisle line to the wall, the loss of those inches and the deviation from the full rectangle in the shape of the space gave infinite trouble and caused serious delay, not only in the erection of the gallery, but in the later case installation.



F-8. MEAT AND GRAIN COURT, SHOWING MODEL OF PACKING HOUSE, AND OTHER EXHIBITS, LOOKING NORTHEAST FROM THE MAIN TRANSVERSE AISLE.

The failure of the French cocontactors to erect at the proper time the obligatory partition between the United States and Norway on the west caused further annoyance and a full month's delay, as a line of wall cases was to be placed against this partition. After weeks of correspondence the structure was finally built, when the cases were completed.

By the middle of March, as the sections of other countries began to show decided animation, it became more and more difficult to get cars to the space without vexatious delays, even after greater delays in getting them from Havre or Rouen. Fourteen hundred yards of fabric for case linings, purchased in America and shipped in good season, was held back in a carload of material four weeks after the car had reached the Exposition grounds, making six or seven weeks from Havre. As a matter of course this necessitated the repurchase in Paris of fabric for lining the cases at a much greater cost, in order to get the cases ready for the exhibits. By the middle of April probably two-thirds of our material had been received on the space. Little or nothing had been done toward placing the exhibits in the cases, however, for many reasons: First, a great deal of our glass, forwarded by the Pittsburg Plate Glass Company, was scattered through the shipments represented by the one-third that had not arrived. The contractor who was to furnish the common glass for the skylights of the cases was unable to fill his contract promptly. Much of the case shelving, shipped from Baltimore, while it had arrived in France, was exasperatingly slow of delivery to the Champ de Mars or to the space.

Even if all exhibit and other material could have been received and placed on the space at the proper time, the state of the atmosphere in the building up to within a few days of the opening date made it impossible to expose delicate exhibits without subjecting them to injury. I refer particularly to the fact that at all times the air was filled with the impalpable powder arising from unfloored aisles in a building which had been under glass twelve years, and to the presence of lime dust during working hours, from the construction of the Salle des Fêtes, which occupied the central third of this immense building. As it was, the finish on the ebonized oak cases was seriously injured, the open grain of the unfilled dull-finished woodwork becoming coated with lime. Add to this the fact that trenches and excavations were being continually opened by the authorities in the main aisles through the space, even as late as the 1st of May, for the laying of electric-light wires, water mains, and water-supply connections, and it will be seen that never were obstacles greater to a successful and timely installation. I wish to state that as late as the 10th of May the floors had not been laid by the French authorities in the main obligatory aisles, while against many of the ebonized cases under the entresol gallery the earth remained where it had been thrown when the trenches or excavations were made. And it followed that many of the exhibits

that were early opened up lost all of their freshness in a very few days on account of the dirt conditions which prevailed.

In this connection I feel it to be my duty also to record the fact that even when cars were placed on the space by the manutention company it often happened that before a customs officer could be induced to break the seals, or after the seals were broken and before the manutention force could be induced to discharge the load, the cars were moved out, usually in the night, when they would be lost for several days. This matter became so vexatious that finally it became our rule to unload cars at our own expense as soon as delivered at destination, sometimes even discharging the shipments on the ground outside of the building in order to make sure of possession of the material. Of course this necessitated extra expense, not only for unloading but for transfer to the space, this work being accomplished by French laborers, who carried the boxes on their shoulders, six men often shouldering one large box. American two-wheel trucks were employed on the space by our own workmen, but the foreign laborers could not be induced to use them.

The labor of installing a collective commercial exhibit is probably tenfold greater than that of installing absolute space exhibits over the same area, the latter installation being accomplished by the exhibitors themselves. The great mass of food products assembled in Washington for final display in my department in Paris was received so late that it was impossible to examine it before shipment to France, and it was also impossible, therefore, to plan suitable installation for case interiors until the material had been unpacked upon the space. It frequently happened that when the material was unpacked it was found to be scarcely sufficient in bulk to install half of the case space set apart for it and already paid for; or, on the contrary, it was found to be sufficient in quantity to fill twice the space set apart for it; it being necessary in either instance to devise a form of installation that would equalize the displays in order that all cases should appear uniformly and properly filled. The forms of installation were varied. Plain shelf arrangement was employed when exhibits were to be crowded; pyramidal shelving or shelf stands were adopted in other instances, or solid pyramids of packages were built up upon plush-covered bases. In still other instances more airy and picturesque forms of interior installation were effected by the use of accessories in glass, wood, and fabrics. The monotony of the installation in the wine and liquor section was relieved in some exhibits by the use of mirrors set across the corners of the cases, the floor being covered with commercial packages, such as the pine shipping boxes with their trade marks and labels, or the paper or straw packing cases used for protecting the glass, etc. In one exhibit an ordinary barrel was shown standing on end and heaped with miniature bottles of the brand of

whisky exhibited, the quart bottles being ranged on narrow shelves above. In a few instances the more thoughtful exhibitors provided their own installation, the exhibit having been prearranged in position at the factory and photographed.

As a result of such varied installation a large force of assistants was required, including ten carpenters, who were employed for weeks getting out the shelving, bases, supports for pyramidal structures, etc., as rapidly as these were designed. And when finished all such wood-work had yet to be painted or covered with fabric by the upholsterers before being placed in the cases, after which the products were arranged upon it. Considerable plate glass was used as shelving, the breakage of large plates in transit supplying abundant material for this form of installation.

With the Government collective displays of purely agricultural material much of this trouble was avoided, as the exhibits were a known quantity before they were shipped to France, and suitable shelves and other forms of installation were provided when the cases were constructed. The cotton, wool, and fiber exhibits were arranged in partition boxes with a plate-glass frontage of 2 by 5 and 3 by 5 feet, 12 to 32 specimens being placed in a box or panel. As these panels with their plate-glass fronts had simply to be placed in position in the case construction planned for them, the installation of this section of my space was completed in a very few days. The insect exhibit was similarly installed, and was put up in a very few hours.

In the installation of the grain exhibit variety was secured by using 4-quart glass jars, 6 and 12 inch glass-front boxes, and gray duck bags open at the mouth—4-quart and half-bushel sizes being employed. The grain in the straw and corn in the ear, and likewise the grasses, were installed upon compo-board panels set in $\frac{3}{4}$ -inch oak frames, various sizes being used from 1 by 3 feet to 3 by 6 feet. The different forms of grain receptacles were installed together in such manner as to give pleasing variety, and the case interiors were also embellished by the use of photographic enlargements of harvesting scenes and by the employment of delicate fabrics for decorative effect.

Photographic exhibits were in every instance displayed in portfolios, these being arranged upon shelves in table cases behind portières to keep out the dust. These table-case racks were also used for the storage of printed matter for distribution. The method adopted for displaying photographs worked out admirably in practice, and the employment of the scheme resulted in a great saving of space. The usual methods of displaying photographs at expositions are by utilizing walls, which is most wasteful of space, and by the use of wing frames, which provide unsatisfactory installation and likewise require more floor space than oftentimes can be allotted for such exhibits. The portfolios employed in Paris measured 22 by 28 inches, which was

the size of the cardboard mounts called for by the regulations. One enlargement or a dozen small pictures were permitted to be installed on one board, a suitable margin only being insisted upon. The table cases in which these portfolios were installed were of proper height to admit of a set of photographs being easily examined by laying the portfolio flat on the plate-glass top of the case, the mounts being turned as viewed, like the leaves of a book.

One large screen, measuring 6 by 21 feet, was employed in the miscellaneous vegetable-product section, upon which were installed thirty-two beautiful bromide enlargements of pictures illustrating prominent agricultural industries, and in the cereal court another series of sixteen enlargements was placed upon a wall area measuring about 8 by 15 feet, illustrating the grain-elevator system of the United States.

A feature of the installation in Groups VII and X was the framed signs placed over the commercial exhibits, by means of which credit was given to the respective firms represented. These signs were printed in 1½-inch gold letters upon dull black cardboard cut to 7 by 28 inches, and inclosed in neat ebonized oak frames of ¾-inch stuff. All the frame material was shipped to Paris in the strip and put together by the carpenter force on the ground. The wording of each sign gave the name of the exhibitor and the home address. The frames inclosing the photographs that were given wall installation were also made on the spot.

The sinking of the French Line steamship *Paulliac* occasioned the loss of all of our installation hardware, tools, and space plans, some of which material could not be replaced by purchase in Paris, which necessitated pushing the work at more or less disadvantage. These difficulties were finally overcome, but not without delays, occasioned by our efforts to find substitute material in the Paris shops.

The work of installation in the agricultural annex was pushed after possession of the building was finally obtained, each exhibiting company or firm attending to the placing of its individual exhibit. For the sake of uniformity, however, as well as to save valuable time, the regulation platforms, 8 inches high, were contracted for and erected by Mr. Farwell, the exhibitors' superintendent, at the expense of the exhibitors. A contract was also made with a sign writer, in order to secure uniformity in the matter of signs. These were in shield form, with gothic letters in gold upon a sage-green background. Another contract was entered into with an upholstery firm for supplying and arranging the plush-covered rope railings required to be employed in this building. The signs were fixed upon the blank wall spaces between the windows, each sign being banked in a trophy of the United States colors loaned to the exhibitors by the Government.

The larger number of exhibitors represented in this building carried out the prevailing color scheme in the shades of carpets used, with very happy results.

The Weather Bureau installation was pushed without delay after the material arrived, the exhibit having been so carefully prepared before it left Washington that it was set in place without serious difficulties. Vexatious delays were occasioned, however, in getting the material to the exhibit space.

The work of installing the horticultural section was not begun until after the Exposition was officially opened, as this part of the palace of horticulture was among the latest construction completed by the French authorities. The simple installation of table stands and low cases that had been adopted admitted of rapid work in putting them together, so that while the work was begun at a late date, it was practically finished before many other exhibits in the American section were in place. Two 5-foot columns with heavy oak bases and capitals were afterwards constructed at the expense of the California Paris Commission, the shafts of the columns being employed in making picturesque exhibits of California oranges. A central structure was also added to supply storage space and office facilities. Palms and other living plants were freely used for decorative effect, in connection with elaborate flag decoration, and appropriate signs crediting the display to the United States.

In conclusion I wish to record that the installation as a whole in my department was beset with difficulties from first to last, not only on account of the delays and annoyances for which no one seemed to be responsible, but on account of the immensity of the exhibit as a whole, the crowded condition of the space and the use of the main aisles as a railroad yard, limiting the number of people who could be advantageously employed at one time upon the work of installation. While a number of American cabinetmakers and workmen had been secured, much foreign labor also had to be employed; men who were unaccustomed to American hours and American methods, which resulted at times in more or less friction, and at all times in constant spurring to accomplish satisfactory results. Whatever trifling mistakes may have been made, I desire to state that as far as the general scheme of installation, including case construction, was concerned, no loss of time was occasioned by the necessity of making subsequent changes on the space, the cases and other construction built in the United States fitting perfectly, according to the space measurements and details of the iron construction of the building received from the Paris office when my work began. The one exception to this was the annoyance occasioned by the narrowing of the entresol gallery 5 inches at one end, in a length of about 215 feet, through no fault of the United States Commission.

THE EXHIBITS IN GROUPS VII AND X.

The exhibits of agriculture and food products were installed in sixteen courts on the ground floor of the palace of agriculture and upon the entresol gallery built by the Commission, with a total of 23,336

square feet of floor space. Two supplemental exhibits belonging to classes 35 and 38, agricultural implements and the United States Weather Bureau, were installed in separate annexes, the first with a gross floor space of 16,228 square feet and the second with a gross floor space of 2,260 square feet. Special exhibits requiring large areas of space, and which could not be accommodated in the Champ de Mars, were installed in different locations at Parc Vincennes, covering a total of 8,218 square feet. This makes a grand total of 50,042 square feet of space devoted to Groups VII and X, in four locations, the exhibits of Group VIII not being considered in this category.

In describing these exhibits I have followed the order laid down in my arrangement classification, rather than according to their place in the French classification, for the reason that a more interesting showing can be made by bringing together associated industries without reference to the special group (VII or X) in which the official classification places them. They were installed on the space after this arrangement and they can be more intelligently described by following in the same sequence. Another reason for this treatment of the subject is that the reports of the experts who collected the material, which are appended in their proper places, deal with the exhibits from the standpoint of their formation of groups of correlated industries, and not in relation to their classes in the catalogue. The classification of exhibits, therefore, according to this scheme, is as follows:

The fish food and collection of food-fish models.

The meat and dairy exhibits.

The bee-keeping and entomological exhibits.

The grain and cereal collection.

The cereal foods and the maize kitchen.

The miscellaneous vegetable products and dried and preserved fruits and vegetables.

The wine and liquor exhibits, mineral waters, etc.

The sugars and confectionery.

Forage, grasses, and the foods of animals.

The leaf-tobacco collection.

The cotton, wool, and fiber series.

The fertilizers.

Food mills and food appliances.

Experiment Station exhibits.

The United States Weather Bureau.

Agricultural implements.

It should be noted that the catalogue of exhibits in my department, which appears in another portion of the Paris Exposition report, is arranged according to group and class, in the same manner as the reports of the jury of awards, so that little or no confusion is likely to result from the proposed arrangement of the historical matter.



F-9. GENERAL VIEW OF FISH-FOOD COURT, LOOKING WEST, DEPARTMENT OF AGRICULTURE.

THE FISH-FOOD COURT.

The fish-food products were installed at the extreme western end of the main space, next to the Norway section, and occupied about 800 square feet of ground-floor area. There were fifteen exhibits, two of which, however, were noncommercial. The fish foods were for the most part installed in ten alcove-case sections, placed against the Norway partition, and embraced exhibits of salmon, codfish, finnan haddie, halibut, mackerel, sardines, crabs, lobsters, shrimps, clams, and oysters. The exhibits were as follows:

Alaska Packer's Association, San Francisco, Cal., canned salmon as put up by this house in attractive 1-pound tin packages. This exhibit filled two deep sections of an extra high alcove case, and was enriched by 10 framed photographs, 22 by 28 inches in size, illustrating various processes incident to the salmon fishing and canning industries. In a 6 by 9 foot pavilion case opposite was placed a model of a canning factory, made for the Paris Exposition by this company, in which all the processes of preparing, canning, and packing the fish were presented to the eye. This comprised not only the factory but the wharf, at which was shown a full-rigged vessel and several smaller craft used in the transportation and handling of the fish. A dozen stuffed salmon thrown into a pile completed the exhibit.

The Pacific Steam Whaling Company of San Francisco, Cal., also showed canned salmon in 1-pound tins. A larger display of the product of this concern occupied the same amount of space in the same alcove case as the foregoing. These two exhibits, with the bright red labels of the tins, which formed the walls and sides the case, made a very attractive and striking display.

M. J. Kinney, Astoria, Oreg., and the Sacramento River Packing Company, San Francisco, also made attractive exhibits of salmon in tins of various sizes, arranged in pyramids. Each exhibit filled a half section of a deep alcove case.

J. W. Beardsley's Sons, New York City, showed shredded codfish, boneless herring, etc., in tin, and besides contributed to the meat section an exhibit of sliced smoked beef. A series of pictures illustrating the cod fishing were placed in the exhibit, which filled a half section of an alcove case.

John R. Neal & Co., Boston, displayed a pyramid of tinned finnan haddie, surmounted by a typical cask buoy and an anchor used by the Gloucester fishermen at the Grand Banks. Filled a half section.

W. H. Wonson & Son, Gloucester, Mass., sent a small but interesting exhibit of smoked halibut, which was shown in the well-known wooden commercial packing boxes employed by this company. The covers of a part of the boxes were removed and glass substituted, in order to show the product.

The Martin Wagner Company, of Baltimore, also made an interesting exhibit of tinned goods.

The Barataria Canning Company, of Biloxi, Miss., had a small but interesting exhibit of tinned crab meat, shrimps, oysters, etc. The exhibit was surmounted by three large ornamental glass jars hermetically sealed, in which the different products were presented to the eye. The company also showed a jar of preserved figs.

J. H. Doxsee & Sons, Islip, N. Y., displayed a pyramid of tins of clams and clam juice; and McMenamin & Co., of Hamilton, Va., sent a fine exhibit of deviled crabs in tin.

There were two displays of sardines, one from E. T. Russel & Co., Boston, Mass., and the other from the California Fish Company, Los Angeles, Cal.

The United States Fish Commission, Washington, sent as a loan exhibit a superb series of models of the food fishes of the United States, life size and colored to nature. Each model was mounted on a handsome mahogany panel and labeled with common and scientific name. A few models of seines and weirs were also shown on two pedestals near. A series of shells completed the exhibit, though several portfolios of photographs should be mentioned.

A feature of the fish-food section was two full-rigged models of Gloucester flyers, or modern fishing vessels, which were shown in two handsome cases, 3 by 9 feet in area and 8 feet high, at either side of the fish court. These were exhibited by the Massachusetts commission. A view of a portion of the fish-food exhibit is presented in the illustrations of this department.

The exhibits in this court were collected by Dr. Tarleton H. Bean, director of fisheries and forestry, and displayed in my department under Group X, class 58, fish foods.

THE MEAT AND DAIRY EXHIBITS.

The dairy exhibit was largely collective, though commercial in character. It was collected and prepared by Henry E. Alvord, dairy expert of the United States Department of Agriculture, who was also the expert in charge of meat exhibits. The dairy exhibits other than those shown in the mammoth refrigerator were for the most part arranged in the court adjoining the fish foods, toward the western end of the space, and occupied an area of 1,250 square feet. The exhibit of dairy appliances was installed upon three large pedestals, measuring 6 by 9 feet, and one pedestal 6 by 14 feet, though two companies represented also made separate exhibits in other locations. Canned butter and condensed milk and cream were also shown in this space, arranged in plate-glass cases.

The exhibits of milk, butter, and cheese were shown in the big refrigerator, which was also utilized for meat products, eggs, etc.

This refrigerator was hexagonal in shape, 20 feet in diameter, and was divided into six compartments. While placed on the space as an exhibit of the Liquid Air and Refrigeration Company, of Boston, Mass., the Government contributed \$2,500 to its expense, which included the plate glass used in its construction to the value of \$1,000, triple plates being employed in each section. It was originally intended that the refrigerator should slowly revolve, and it was so constructed, but after setting it up on the space there were difficulties in the way of carrying out this idea and it was abandoned. The mammoth affair, with its interesting interior installation, was always an attractive object, especially to many foreigners, to whom such a cold-storage appliance was a novelty.

The butter and cheese exhibits were especially interesting, and the United States was remarkably successful in securing so many and such high awards in this class, considering the fact that these products were brought from 3,000 to 4,000 miles to be exhibited, almost side by side with European products, many of which were produced within a few hours' journey from Paris. The details regarding these exhibits, however, are given in Major Alvord's report, which appears on another page. The dairy exhibits were as follows:

DAIRY EXHIBITS.

American Separator Company, Bainbridge, N. Y.: Dairy appliances, cream separator.

Aspinwall Manufacturing Company, Jackson, Mich.: Churn.

D. H. Burrell, Littlefalls, N. Y.: Combined churn.

J. S. Biesecker, New York City: Dairy appliances.

Buhl Stamping Company, Detroit, Mich.: Dairy and stable appliances.

Cornish & Co., Rochester, N. Y.: Model of cream ripener.

Champion Milk Cooler, Cortland, N. Y.: Milk and cream coolers.

Cornish, Curtis & Green Manufacturing Company, Fort Atkinson, Wis.: Model of an American creamery fully equipped; also dairy appliances.

Dairymen's Supply Company, Philadelphia, Pa.: Dairy supplies and machinery.

Elgin Manufacturing Company, Elgin, Ill.: Dairy appliances.

Fairfield Dairy Company, Montclair, N. J.: Photographs and models illustrative of the work of the dairy.

C. L. Fitch, Fort Atkinson, Wis.: Scale for butter coloring.

Emil Greiner, New York City: Dairy appliances.

H. B. Gurler, Dekalb, Ill.: Dairy appliances and illustrative photographs.

William A. Hall, Bellows Falls, Vt.: By-products of the dairy.

J. F. Johnson & Co., Racine, Wis.: Dairy appliances—antidirt milk pail.

Moseley & Stoddard Manufacturing Company, Rutland, Vt.: Dairy appliances—strainers, hand printers, etc.

National Specialty Company, Racine, Wis.: Milk pails.

Nelson, Hall & Co., Montgomery, Vt.: Butter tubs and boxes.

A. H. Reid, Philadelphia, Pa.: Milk separators, pasteurizers.

St. Louis Dairy Company, St. Louis, Mo.: Photographs.

P. M. Sharples, Westchester, Pa.: Cream separators.

Star Milk Cooler Company, Haddonfield, N. J.: Milk cooler, bottling machine, etc.

Vermont Farm Machine Company, Bellows Falls, Vt.: Cream separators, churns, dog powers, etc.

C. G. Wickson & Co., San Francisco, Cal.: Dairy appliances.

Wilder Manufacturing Company, Springfield, Mass.: Electrical temperature indicator.

Thomas Williams, Brooklyn, N. Y.: Felt jackets for milk cans.

American Condensed Milk Company, San Francisco, Cal.: Condensed and evaporated milks.

Armour & Co., Chicago, Ill.: Butter and frozen eggs.

Borden's Condensed Milk Company, New York City: Condensed milk, evaporated cream, and condensed coffee.

Dairymen's Union, San Francisco, Cal.: Milk, cream, and butter. (Exhibited also smoked meats.)

A. D. De Land, Sheboygan, Wis.: Cheese.

Fred. Harvey, Galt, Cal.: Milk, cream, butter, and cheese.

Helvetia Milk Condensing Company, Highland, Ill.: Highland brand evaporated cream.

Maine Condensed Milk Company, Whitefield, N. H.: Condensed milk.

New York State commission to Paris Exposition, Lowville, N. Y. The following individuals and firms contributed to this collective exhibit: R. H. Babcock, cheese; A. H. Baunest & Co., cheese; R. H. Bent, butter; Briarcliff Farm, butter; A. & H. E. Cook, cheese; F. E. Dawley, cheese; F. P. Dunaway, cheese; D. A. Goodrich, cheese; W. W. Hall, cheese; Meridale Company, butter; Robt. Norton & Co., cheese; Rockdale Creamery, butter; Rosedale Creamery, butter; Stephen Underhill, cheese.

Pacific Coast Condensed Milk Company, Seattle, Wash.: Condensed milk.

Pacific Creameries, San Francisco, Cal.: Milk, cream, butter, and cheese.

Russell Cream Company, San Francisco, Cal.: Milk, cream, butter, and cheese.

St. Charles Condensing Company, St. Charles, Ill.: Unsweetened and sterilized evaporated cream.

Simpson, McIntire & Co., Boston, Mass.: Creamery butter.

Vermont Condensed Milk Company, Richmond, Vt.: Condensed milk.

Walker-Gordon Laboratory Company, Boston, Mass.: Modified milk and milk products.

The meat exhibits occupied portions of the two courts lying on either side of the main transverse aisle, the one on the west being occupied by the big refrigerator mentioned above and the one on the east partly utilized for grain exhibits. The meat products occupied four large pavilion cases flanking the refrigerator, and the line of alcove cases on the west, or immediately in its rear. Two large exhibits of commercial houses occupied the center space of the court to the east of the main cross aisle, being flanked on the sides and at the back to the east by the grain cases before mentioned.

The products displayed in the meat section included almost a full line of American canned, deviled, and smoked meats, lards, soups, meat extracts, gelatins, etc., fresh beef, mutton, pork, poultry, and eggs. The waste products of the packing-house industry were also shown, together with photographic and other illustrative material, the exhibit in its entirety fitly representing the extent of this great industry in the United States.

The Armour Company, Chicago, occupied two pavilion cases 4 by 6



F-12. NEAR VIEW OF DAIRY COURT, LOOKING NORTHEAST, DEPARTMENT OF AGRICULTURE.

feet on the south side of the big refrigerator, these being filled with canned goods and meat extracts in variety, artistically and attractively arranged. This company also displayed a series of bone and other waste products, animal oils, etc. A most interesting photographic display was a series of bromide enlargements in two immense frames about 18 feet long, illustrating the many steps in the slaughtering of a hog or steer, and the handling of the meat in the packing house.

Flanking this exhibit on the north of the big refrigerator was the display of the Armour Packing Company, of Kansas City, also filling two 4 by 6 cases. This company showed a full line of pork and beef products in tins, those in the more prominent case being arranged in the form of a temple. Smoked meat in canvas was also displayed in variety.

The exhibit of Swift & Co., Chicago, was placed in a section adjoining, just across the main transverse aisle, and filled a 6 by 6 case. A handsome model of a refrigerator car was also shown, exhibiting the method of transporting carcasses.

In the same section with the foregoing was the exhibit of Libby, McNeill & Libby, of Chicago. The leading feature of this exhibit was the model of a packing house, covering a space of about 100 square feet, which showed a modern packing house in operation, electric power and light being used. A model of the Ferris wheel occupied a 6 by 6 case near by, the cars being replaced by small swinging platforms carrying small tins of meat.

The Franco-American Food Company, Jersey Heights, N. J., showed preserved meats and soups, game patés truffled, etc., arranged in two alcove case sections in the rear of the refrigerator.

The German-American Provision Company, Chicago, exhibited canned meats and sausages. A small but interesting series arranged in one of the alcove cases.

N. Goetjean, San Francisco, Cal., canned soups and meats (also canned vegetables)—an alcove case exhibit.

J. H. W. Huckins & Co., Boston, Mass., showed canned soups and deviled meats.

Other meat exhibits were as follows:

Imperial Packing Company, Canajoharie, N. Y.: Canned bacon; beef and ham sliced, in jars.

Kapp & Street, San Francisco, Cal.: Canned meats, tamales, chili con carne, frijoles, enchilades, chicken soups.

Charles B. Knox, Johnstown, N. Y.: Gelatin for domestic use.

Anker Manufacturing Company, New York City: Bouillon capsules, liquid bouillon, etc.

Michigan Carbon Works, Detroit, Mich.: Gelatin for food and for mechanical arts, in 2-ounce packages and in bulk. This attractive exhibit occupied the top of one of the table cases on the main aisle.

Richardson & Robbins, Dover, Del.: Canned meats, etc.; (also canned oysters and plum pudding).

I. X. L. Tamale Company, San Francisco, Cal.: Tamales, frijoles, chicken soup, etc.

Van Camp Packing Company, Indianapolis, Ind.: Canned meats and soups (also canned vegetables).

Union Stock Yards, Chicago, Ill.: Photographs.

A more detailed account of the scope of the exhibit of meat and dairy products is submitted in the report of Maj. Henry E. Alvord, dairy expert, as follows:

The United States exhibit of meats and meat products comprised meats fresh dressed, salted and smoked, poultry, eggs, and cooked and canned meats and meat preparations in great variety. Also sausages, soups, lard, and meat extracts. There were besides a collection of by-products of the meat-packing business, edible and inedible animal fats and oils, glues and gelatins, pharmaceutical preparations, soaps, horn, hair, hoofs, bones, and fertilizers. The collection of the meat products in sealed cans and glass jars was extremely varied and represented the preparations of most of the leading houses of the country engaged in this industry.

The hams, bacon, lard, sausages, poultry, eggs, and fresh meats were shown in the large display refrigerator, provided by the commission in cooperation with the Liquid Air Refrigeration and Power Company, of Boston, and which formed a central feature of this part of the agricultural exhibit.

The dressed beef, mutton, and pork came from the abattoir of the Schwarzschild & Sulzberger Beef Company, in Kansas City. Fresh supplies were received every two or three weeks; the meats were usually dressed about three weeks before arrival in Paris; were thoroughly chilled before starting and then kept at low temperature during transportation and which exhibited. They were perfectly good for five or ten days after reaching Paris, and might have been kept there a month in fine condition had it been possible to hold the temperature in the refrigerator as low as desired. Cold air was the only preservative—no salt or chemicals of any kind were used—and the meat was not frozen at any time. The dressed poultry was frozen, and included turkeys, geese, ducks, capons, roasting fowls, and broiling chickens, they were packed by Priebe & Simater, of Minonk, Ill. The eggs, preserved like the meats by even, low temperature, came from the cold-storage supply house of Boardman Brothers, of Nevada, Iowa; they were packed in April.

All of these fresh animal products were supplied in periodical installments by the United States Department of Agriculture in connection with the current experimental exports of farm products by that Department. They were carried in the cold chambers of the Schwarzschild &

Sulzberger Beef Company on the American line of steamers as far as Southampton, at the cost of the Department, which also provided portable refrigerators for carrying the meats to Paris. They remained the property of the Department, and, after exhibition, were disposed of to the best advantage, testing the French markets for such supplies. Consequently the Commission only had the expense of transportation from Southampton to Paris and of maintaining the display refrigerator. This part of the exhibit was of constant interest and a cause for astonishment to visitors and attracted much attention on the part of merchants and provision houses in Paris. It led to orders from the latter, before the close of the season, of direct trial shipments of fresh meats from America to Paris, and to large sales of hams, lard, and sausages.

Connected with the display of these animal food products was an effective exhibition of the resources of the United States in this line, and the facilities and methods of the immense dressed meat and packing house business. The Secretary of Agriculture, through the Bureau of Animal Industry, contributed maps and statistics showing the number and distribution of farm animals in the country, and a large collection of photographs illustrating ranch life, feeding establishments, and the production of food animals; also of typical examples of animals of this class. Armour & Co., of Chicago, sent a large and fine set of photographs showing the progressive operations of converting cattle and hogs into dead meats, and very fine views of the Chicago Stock Yards, accompanied by statistics of the business of that vast establishment. Swift & Co., with Libby, McNeill & Libby, made two special exhibits of great popular interest. One was a complete model of their large packing house at Chicago, lighted by electricity, and showing, by a number of mechanical movements, the business in progress; the other was a model refrigerator car for transporting fresh meats and meat products. There was also a very large collection of fine photographic views of the exterior and interior of many of the large packing houses in the United States. The display refrigerator in use, being of Chase's Cold-Blast patent, and operated with ice, was itself a part of the exhibit in this section.

The dairy products of the country were shown in two different kinds of exhibits. The imperishable articles and a portion of the fresh products kept in the big refrigerator were included in the permanent exhibition at the palace of agriculture; but the greater part of the fresh milk, butter, and cheese was entered at the three temporary dairy shows which were held (most unfortunately) at Vincennes, in the months of May, July, and September.

The permanent dairy exhibit included the illustrative and statistical matter, giving a general view of the extent, distribution, and character of the dairy industry in the United States; the large and varied col-

lection of condensed milk and cream (representing the product of ten different condenseries); several brands of butter in sealed packages for the export trade; various forms of potted, prepared, or preserved cheese, and an excellent assortment of articles showing the economical use of the by-products of dairying. There were also, at all times, in the display refrigerator, good samples of fresh dairy products, milk, cream, butter, cured cheese, potted cheese, and such specialties as kumyss, matzoon, and the soft and fancy forms of cheese. The United States was the only country which maintained a continuous exhibit of fresh dairy products.

The general illustrative exhibit was contributed by the Dairy Division of the United States Department of Agriculture. This included fine photographs of dairy cattle, of the buildings, equipment, and operations of several successful dairy schools, exterior and interior views of representative creameries and their work, and maps and statistical data. There was also a complete historical illustration, by photographs, of the development of the Babcock milk tester, which has contributed so much to economize and promote the dairy interests of the United States during the last ten or twelve years. The statistical maps showed the number and distribution of dairy cows in the United States, according to the latest available data, and the number and location of creameries and cheese factories in Iowa and New York. These two States were selected as being the largest producers of butter and cheese, respectively. For similar illustrative data, by counties, four maps were added. Jefferson, Sheboygan, and Greene counties, in Wisconsin, and Freeborn County, Minn., were chosen for this purpose. Jefferson shows the creamery system developed to a remarkable degree, and Freeborn well illustrates the rapid growth of this industry in the newer dairying districts of the Northwest. Sheboygan and Greene are representative counties, respectively, for large production of the standard American factory cheese and of the American imitations of some of the softer foreign varieties.

The Secretary of Agriculture provided, through his Department, for frequent shipments of fresh dairy products to Southampton, England, in the same way as for meats, and with greater regularity. These supplies were especially timed for entry at the temporary dairy shows. The entries on those occasions were managed so as to provide, as far as possible, a different set of exhibitors at each show. Great care was taken by the officers of the Department to have different parts of the country represented and to exhibit only products of the highest quality. The assistance of State dairy authorities was obtained in selecting farms and factories to be invited to exhibit. These invitations were generally extended to those who had been prize takers at large exhibitions in this country. Yet few of the offers of exhibits voluntarily made were declined where the quality of the products were satisfactory.

Products were included from twenty States as widely separated as Maine, Georgia, Minnesota, and California, and from 105 different contributors. Butter was exhibited from the four States above named, as well as twelve others; cheese from California, Wisconsin, Michigan, Ohio, New York, and Vermont; condensed milk from Atlantic and Pacific States, and several between, and fresh milk and cream from Illinois, New Jersey, and New York. The portable refrigerators in which these products were safely transported from New York to Paris and out to Vincennes, and by which they were preserved and protected during the shows, were provided by the Department of Agriculture. The Commissioner-General supplied the ice necessary for use after the products reached Paris.

The natural milk and cream in commercial form was a feature of the exhibit which attracted much attention. It arrived in nearly all cases in good condition, and remained sweet for several days afterwards, being quite sound on the fifteenth, eighteenth, and sometimes the twentieth day after leaving the cow. Regular city-delivery bottles were used, the only extra precautions being to put on two paper caps instead of one, and to cover them with paraffin so as to absolutely exclude the air. Foreign visitors and even expert milk dealers could hardly believe that nothing but "cleanliness and cold" were used to preserve these products.

American butter was shown from private farms and from creameries in a great variety of forms—tubs, boxes, crocks, jars, bricks, prints, and fancy packages. The butter was nearly all more or less salted. But one lot, entirely free from salt, and probably the only attempt ever made to send fresh butter from this country to Europe, proved entirely successful. Although, being two or three weeks old when reaching Paris, the first freshness had necessarily disappeared, in nearly all cases the butter was placed on exhibit without being perceptibly impaired in quality. There were 56 exhibitors of butter from the United States.

Of cheese there were 37 different entries, most of them being of the standard American factory product and of a high average quality. There were also some excellent imitations of foreign varieties and a few fancy forms peculiar to the United States.

One case was occupied by a collection of articles and specimens illustrating the by-products of dairying. Plain dried casein was shown, as separated from skim milk by artificial coagulation and precipitation, and prepared for use in making a sizing for paper and the basis for an excellent water-mixed paint. Desiccated casein was also shown as adapted to food purposes, under the names of faracurd, eggine, and egg powder. Milk sugar and pure albumen derived from whey were included in the collection. All of these products were contributed by the Casein Company of America, whose principal office is in New York

City. Another exhibit of the same class was nutrium, a powder containing all of the solids of skim milk in a soluble and digestible form. This is found to add much to the quality and food value of baking products and seems destined to become an extensive and important adjunct to dairying as a method for utilizing vast quantities of skim milk. The National Nutrient Company of Jersey City, N. J., contributed this new and interesting food product.

To illustrate the advance made in the United States in the application of mechanical aids to dairying, the Secretary of Agriculture caused to be prepared a collective exhibit which included single specimens of a large variety of machines, appliances, tools, and implements in use in modern dairies, creameries, and cheese factories. There were milking pails of new and improved patterns, milk strainers, coolers, and aerators, cans for railway and wagon transportation, bottles and jars, in variety, for city delivery of milk and cream, and machines for filling bottles. The recent great advance in facilities and equipment for supplying pure milk for towns and cities was further illustrated by a fine collection of photographs and material, and a large assortment of apparatus for milk testing by various methods, and of dairy glassware in general. There were several of the Babcock milk-testing machines, for hand and for power. Three different patterns of centrifugal cream separators were shown, P. M. Sharples, of Pennsylvania, and the Vermont Farm Machine Company making commercial displays of separators in addition to the collective exhibit. The latter company also showed the most approved method of gravity separation of cream, by the deep, cold-setting process, in the form of the Cooley creamer. The collection included cream ripeners, pasteurizers, pure cultures for flavoring cream, churns, butter workers, combined churns and workers, butter colors, molds for putting butter into market form, and a variety of butter boxes, tubs, and commercial packages. Notable among the smaller articles were new and ingenious apparatus for testing and regulating the uniform salting and coloring of butter, invented by Superintendent Fitch, of the famous Hoard's Creameries of Wisconsin. The cheese-making appliances were few, as space did not permit many large fixtures. Several models of approved implements were shown. As a complement to this varied and most creditable exhibit, there was a model of a typical American creamery building, with boiler, ice house, and complete equipment in miniature, fitted to go through the motions of working by the application of either steam or electricity.

INSECT PRODUCTS AND ENTOMOLOGY.

The exhibits in this class were mainly illustrative of the bee-keeping industry, collected by Mr. Frank Benton, of the United States Department of Agriculture, and displayed at one side of the dairy section. There was an interesting entomological exhibit, however, arranged in

a small court under the west stairway leading to the entresol gallery, and adjoining the Deering retrospective exhibit, prepared under the direction of L. O. Howard, Ph. D., chief entomologist of the Department of Agriculture. The Massachusetts Gypsy Moth Commission, Malden, Mass., sent a display of devices used by it in fighting the gypsy moth; also a series of large photographs illustrative of methods and results in its work in this direction.

There were but four bee-keeping exhibits, and these, which were grouped together in a large 6 by 6 pavilion case upon a pedestal, were as follows:

A. I. Root & Co., Medina, Ohio: Display of beehives and other appliances, and the A B C book on bee culture, published by this house.

W. T. Falconer Manufacturing Company, Jamestown, N. Y.: Varieties of beehives and sectional honey boxes.

Charles Dadant & Son, Hamilton, Ohio: Display of comb foundation.

Frank Benton, Washington, D. C.: Queen bee cages; specimens and bulletins on bee keeping.

The California Packing Company sent a very small exhibit of honey in glass, which was displayed with its other food products, this being the only honey shown in the agricultural section.

The following interesting report relating to the exhibits in class 42 and also illustrating the work of the Division of Entomology of the United States Department of Agriculture, was prepared by L. O. Howard, entomologist of the Department and expert in charge of the collection and preparation of the material in this class for the United States Commission:

REPORT OF L. O. HOWARD, PH. D., ENTOMOLOGIST.

This exhibit was comprised under seven distinct main groups, which, with their purposes, may briefly be described as follows:

(1) A series of specimens illustrating the San Jose scale (*Aspidiotus perniciosus* Comst.) and its allies. Following the decree promulgated by the German Government in April, 1898, prohibiting the admission of American plants, fresh fruit or dried fruit, or fruit waste into Germany on account of the danger supposed to exist of the importation and establishment of the San Jose scale in Germany, many other foreign governments passed similar decrees. The attention of horticulturists all over the world and of governments in general was thus attracted vividly to this particular insect and to allied forms. All scale insects are especially liable to be transported from one country to another on nursery stock, and, as a result, most of the injurious species in this group of insects which occur in any civilized center have been introduced in this way. On account of this vivid and world-wide and immediate interest, a full exhibit was made of the San Jose scale in all stages and upon a large variety of plants, and of other scale insects which are liable to be imported from one country to another.

(2) A series of specimens illustrating the insect fauna of human feces—a contribution to the study of insects as carriers of disease. Probably no one subject is attracting more attention at the present day from medical men than insects as etiological

factors in disease. The spread of malaria by the agency of certain mosquitoes and the spread of intestinal diseases by certain flies has become generally accepted and has attracted the attention of laymen as well as medical men to this important subject. The exhibit showed seventy-seven species of Diptera and a large number of other insects which either breed in or are attracted to human excrement and which thus may be active agents in the spread of enteric fevers and other diseases of the intestinal tract. It is believed that this is the first collection of insects of this kind which has ever been brought together. The results of the investigations, based upon the rearing of the insects exhibited, have been published in the Proceedings of the Washington Academy of Sciences, Volume II, pages 541-604.

(3) A series of specimens illustrating the interrelations between injurious insects and their parasites. The importance of the natural enemies of injurious insects has long been recognized, and within the past few years international exchanges of beneficial insects have been made with the most excellent results. The introduction of the Australian ladybird (*Novius cardinalis*) from Australia into California resulted in the practical extinction of the white or fluted scale of the orange, an insect which threatened the existence of the citrus fruit industry of the Pacific coast. The same insect has been sent from America to South Africa, to Portugal, and to Egypt with similar beneficial results. Other interchanges of insects preying upon, or parasitic upon, injurious species have also been made. But there are among the parasitic forms certain interrelations which must be thoroughly understood before their beneficial function can be gauged. There are parasites upon parasites, and again parasites upon these secondary parasites, and even parasites upon these tertiary parasites. In the exhibit under consideration an effort was made to display in striking form the interrelations of several groups of these parasites which are concerned with one of the important leaf-eating caterpillars of North America (*Orgyia leucostigma*).

(4) A series of specimens illustrating the insects affecting the grapevine. This exhibit was considered especially appropriate to this particular exhibition on account of the great French viticultural interests and on account of the fact that France practically stands at the head of the wine-growing industry of the world. All of the American insects which injure the grapevine were illustrated in the exhibit, and at the close of the Exposition this portion of the collection was presented to the inspector-general of viticulture of France, Prof. Pierre Viala. Very few of the insects shown exist both in Europe and in North America. Some of them, however, occur on both continents. All of those which are common to both regions are of European origin, with the exception of the famous grapevine Phylloxera (*Phylloxera vastatrix*), which is an American species imported into southern Europe, probably about the middle of the last century.

(5) A series of specimens illustrating the insect enemies in North America of the following crops: (a) Sugar beet; (b) garden and truck crops; (c) strawberry and blackberry; (d) sweet potato and tomato; (e) tobacco; (f) apple; (g) small grains; (h) stored grain; (i) cotton.

For the most part crops were selected which are grown in one portion or another of Europe, as it was deemed that an exhibit of the American enemies of these crops would be interesting to persons interested in agriculture not only in Europe but in other parts of the world. An effort was made in each case to show all of the different stages of the insect represented, and also to indicate its method of work upon the plant—whether upon the root, in the stem, on or within the leaf, or in the fruit. Where it was not possible to show this by means of actual specimens of the damage, illustrations were given.

(6) Illustrations of American methods of fighting injurious insects. It was found, greatly to the disappointment of the entomologist of the Department of Agriculture, that American manufacturers of insecticide machinery declined without exception to send exhibits of their machinery under the auspices of the Department. This



F-10. VIEW OF MEAT COURT, SHOWING MAMMOTH REFRIGERATOR AND PACKING-HOUSE EXHIBITS ON EITHER SIDE, FROM MAIN TRANSVERSE AISLE, LOOKING WEST, DEPARTMENT OF AGRICULTURE.

was due entirely to the restrictions which the Commission was obliged to place upon such exhibits—restrictions as to size, and regulations regarding the payment for cases. No effort was spared to induce manufacturers to send exhibits, but the refusal was unanimous. Some disappointment was expressed in Paris by persons who had hoped to see exhibits of such machinery, since American devices of this kind have a high reputation among agriculturists in most parts of the world; but the blame for the failure must rest upon the manufacturers.

(7) American apicultural industry. The apiarian exhibit from the United States consisted chiefly of the frame hives most employed in the country, a good collection of the implements used in the apiary, and a fine exhibit of the various makes and grades of comb foundation. The exhibit of honey and beeswax was small and not at all creditable to the country, scarcely giving a hint of the magnificent possibilities in this direction as exhibited by the numerous large and well-filled show cases which were seen in the Agricultural Building at the Columbian Exposition. The explanation of this lack in the honey and wax exhibit is to be sought chiefly in the fact that the preceding season had been a poor one for producers in nearly every part of the Union. The general response had been, therefore, that no honey, or very little honey which the producer deemed fit to send abroad for exhibition, was on hand. The very high standard required in our best markets and at our home exhibitions for honey that is to rank as fancy comb or first quality extracted no doubt operated to keep out many exhibits that would have taken good rank at the Exposition. The distance, doubtless, deterred others who feared that consignments of comb honey especially would hardly reach the exhibiting cases in good shape. A third, and also important, reason is to be found in the fact that comparatively little development has ever been given to the export trade in honey; moreover, the exporters are not the producers, and the latter could not see the probability of direct personal benefit through making an individual exhibit of honey and wax. For the manufacturers of apiarian supplies the case was quite different, since they have, ever since the perfection of cylinder comb foundation machines, supplied by far the greater number of those used in the whole world, and the section box, being distinctly an American invention, the manufacture of which has always been more perfect in this country than elsewhere, has been an article much called for. Our white poplar and basswood timbers have contributed to hold this trade to a notable degree for America. Other supplies, such as smokers, drone traps, honey knives, bee escapes, etc., and also hives in the flat, have met with a constantly increasing demand abroad. The manufacturers were, therefore, encouraged to present a general exhibit representing the excellent standard reached in this country in the production of all utensils and supplies for the apiary.

The apiarian exhibit of this country was located in the United States Government building, and was included in Groups VII and X, class 42. In Group VII, 6 exhibitors, all from California, made 12 entries, which included comb and extracted honey, and beeswax. Under Group X, 4 exhibitors made 46 entries, including various styles of frame hives, one comb-foundation mill, bee smokers, queen mailing cages, various weights of surplus and brood comb foundation, section boxes, honey boards, bee veils, honey knives, drone traps, bee escapes, etc. The total floor space allotted having been but 117 square feet, was well occupied, and, as regards Group X, very creditably for this country, the French apiarian journals themselves having pronounced it "an important exhibit," while at the same time they expressed their regret that the French exhibit in this group was so poor and so ill arranged. The American exhibit, besides coming into competition with that of France and her colonies, Algiers, Tunis, Guadaloupe, and French Guiana, competed also with large exhibits from Belgium, Russia, Austria-Hungary, and Italy, and less important ones from Great Britain, Spain, Portugal, Bulgaria, Servia, Roumania, and Greece, while most other European powers had some representation, likewise Mexico and Peru

among the American republics. The rank taken by the exhibit from the United States may be judged from the fact that out of the 60 recompenses awarded in apiculture, including medals and honorable mention, 4 medals (2 of gold and 2 of silver) were awarded to Americans. The leading French apiarian journal in commenting on the awards in apiculture remarked that "while in the main they were just, a few exhibitors who received silver medals hardly merited more than bronze ones;" and further, that three of the Americans who received medals, and whom it names, should have been more highly recompensed, as, according to their view, "the highest recompense should have been given to these masters, because they are really the first."

THE EXHIBIT OF GRAINS AND CEREALS.

It was originally intended to install the grain collections together in one section, and a space of over 1,000 square feet was set apart for this purpose. The withdrawal of the exhibits of several large milling concerns at the last moment and the pressure for increased space for the meat industry necessitated encroaching upon the grain section with the meat exhibit, the cereals thus displaced being shown in the cereal product court adjoining. On this account, therefore, the grains and cereals were scattered over two large sections, occupying case space as follows: Two double alcove cases, 4 by 21 feet, or twenty-eight 3-foot sections of running case construction, besides ten additional sections against the truss in the space just east of the main transverse aisle; twenty-six sections of alcove case construction in the cereal product court, besides an exhibit of corn in the ear superbly installed in an octagon case, 8 feet in diameter and 12 feet high in the center of the cereal product court. Small special exhibits were also shown in a wall case against the façade to the right of the main portal, in a pier case in one of the arches of the façade on the front main aisle, and in the tops of two of the table cases at the rear of the sections.

This splendid collection was brought together by the Chief and assistants of the Division of Vegetable Pathology of the United States Department of Agriculture, working under the direction of this Department in cooperation with field assistants appointed by the United States Paris Commission, and was installed by Mr. M. A. Carleton, who was practically in charge of the work of collection. The scheme of the exhibit as originally outlined contemplated as one of the scientific features a series of panels upon which were to be displayed wheat plants with roots, stems, leaves, and filled heads, illustrating the manner of growth of leading export varieties. The work of collecting such a series was found to be impracticable, however, without the incurring of greater expense than could have been allowed for the purpose, the taking up of the roots especially necessitating more care and labor than the average farmer would be willing to bestow upon the work. If the matter could have been taken in hand some months earlier no doubt the experiment stations of the country could have supplied a full series. As it was, the panel exhibit was reduced to grain in the straw as taken from the sheaf, and to corn in the ear.

The grain samples were given simple shelf installation, but suggesting pyramidal arrangement, linen bags, boxes with glass fronts, and glass jars 1 foot in height being employed. The installation was so varied that monotony was avoided, and the cases were relieved wherever possible by the use of large photographs and of drapery. In only one instance was there any attempt at fancy installation, three sections of one of the inner alcove cases in the cereal court being arranged for picturesque effect by the additional use of large glass spheres, ornamental flaring jars with covers, and plate-glass shelving, in connection with the regulation packages used in the main exhibit. No such complete showing of the grains and cereals of the United States was ever before made in a foreign country, and it is doubtful if a more scientific and systematic collection has ever been brought together at any exposition. And it may be added that no foreign country at the Paris Exposition of 1900 displayed collections that could in any way be compared with it. The fact that a score of letters were received from foreign commissions, from European museums, and from seed firms, at the close of the Exposition, asking for some of the specimens for permanent exhibition, attested the interest that was created in the exhibit among those who studied it.

In connection with this exhibit it is proper to mention the superb series of four pictures that were presented to my department by the Burlington and Missouri River Railway Company of Nebraska, and which held so conspicuous a place at the Omaha Exposition of 1898. These pictures, worked out in maize husks, leaves, and grasses, and other natural field products, were the work of Mr. George Upp, artist and portrait painter, and depicted rural scenes in the far West. They were brought to Paris as decorative features for Groups VII and X, and were therefore not entered as exhibits for award.

The pictures were remarkably fine in the manner of their execution, in the color values, and in perspective, and, at the distance from the floor at which they were hung, were considered by casual observers to be oil paintings of merit. They may be described as follows:

Two of them were intended to illustrate how the early settlers came to Nebraska thirty years ago in wagons drawn by oxen, traveling an average of 15 miles per day; how they built their small houses of one or two rooms, with walls of prairie sod, and plowed up the virgin prairies with cattle, then the cheapest and most available draft animals.

The other two pictures showed the same farm after thirty years of industrious development. The very low price of land, the healthful and moderate climate, combined with the most fertile soil in the world, made it possible for the poor young couple of thirty years ago to become the owners, free from debt, of a magnificent farm with commodious and first-class buildings, including thoroughbred horses, cattle, and other live stock. They and their children now use carriages and bicycles when going to and from the beautiful city, all

built within these thirty years, the tall factory chimneys of which are faintly outlined in the background of the picture; and when they wish to make a longer journey they use the fast trains of the said "Burlington Railroad Company," which holds the world's record for speed, having covered the distance of 1,025 English miles (1,649.6 kilometers) from Chicago to Denver, two terminal points of its lines, in exactly 1,047 minutes. No exhibit in my space told so eloquently the story of our agricultural development during the past thirty and forty years.

I append herewith the detailed report of the United States cereal exhibit at the International Exposition of 1900, submitted by the expert in charge of the work of collection and preparation.

REPORT OF B. T. GALLOWAY.

The work of collecting and preparing the cereal exhibit of the United States for the Paris International Exposition was assigned to the Division of Vegetable Physiology and Pathology, and the cerealist, Mr. M. A. Carleton, of this Division, was put in charge of the work. The preeminent idea from the beginning was to make a practical exhibit, which would draw special attention to the vast resources of the United States in the production of cereals. To this end it was necessary to emphasize the export varieties especially, and this was done throughout the entire work. To best carry out this purpose a special exhibit of large samples of the leading export varieties was planned. An exhibit of such varieties alone, however, would not fairly represent the entire country, the large quantities of grain raised each year in some districts being used entirely for home consumption, consequently it was planned to make an exhibit of smaller samples also, in order to show the geographic distribution of varieties throughout the United States. This exhibit, as might be expected, was the largest, there being so many different varieties grown throughout the immense territory, although the varieties used most for export are produced in comparatively small portions of the country.

The establishment of standard grades for grain at the offices of grain inspection in our large cities is such an important matter to foreign buyers that it was thought advisable to exhibit a number of small samples representing these grades.

The results of producing new varieties in this country by selection and hybridization was illustrated by an excellent collection of hybrids and other new varieties of wheat, many of them being shown both in the straw and the thrashed grain.

In connection with the exhibits showing export varieties and geographic distribution, which were made up of samples of thrashed grain, a large amount of small grain in the straw and corn in the ear was also exhibited, this exhibit being separate and shown on panels.

In addition to the series of exhibits of cereals, there was a large collection of pictures and maps illustrating the harvesting and subsequent handling of grain in this country, the different wheat districts and the production of wheat and corn and average yields of wheat per acre by States.

To summarize, there were six general exhibits as follows: (1) An exhibit showing the geographic distribution of varieties, composed of 4-quart samples of thrashed grain; (2) an exhibit of leading export varieties made up of half-bushel samples of thrashed grain; (3) an exhibit on panels of samples of small grain in the straw and corn in the ear; (4) an exhibit of pint samples of thrashed grain, illustrating standard grades established at the principal grain markets; (5) an exhibit of new varieties of wheat produced by hybridization and selection; and (6) an exhibit of pictures and maps illustrating the handling of grain, wheat areas, etc.

The following plan for the collection of the exhibit showing geographic distribution of varieties was adopted and proved very satisfactory: A list of the names and addresses of 380 county correspondents of the division of statistics of this department was obtained from that division, there being eight or nine on an average in each State. Letters were sent to these correspondents asking them to collect and send in to the Department from their respective localities 4-quart samples of from five to ten of the principal varieties there grown, and for this purpose 4-quart bags and Government mail sacks were sent to each. It was estimated that about 800 samples of this kind would be required and that over 900 should be obtained in order to make allowance for all probable failures. Nine hundred and fifty of these samples were actually received and these, together with 100 from other sources, made over 1,000 in all, or over 200 more than were necessary. Later on, however, more space was granted and nearly all the extra material was finally entered for exhibition. In addition to the large number of samples received, all the material was of good quality and generally speaking was offered in good condition. In this exhibit there were 390 samples of wheat, 290 samples of corn, 190 samples of oats, 76 samples of barley, 55 samples of rye, 17 samples of rice, 16 samples of buckwheat, and 3 samples of emmer.

A very different plan of collection was adopted for the export exhibit, most of the material being personally solicited in the three most important cereal regions. Mr. Carleton canvassed the Pacific coast States, and two special collectors appointed to aid in the work, Mr. C. F. Doane, assistant dairyman of the Maryland Agricultural Experiment Station, and Mr. J. H. Shepperd, professor of agriculture of the North Dakota Agriculture College, canvassed the North Central States and the States of the Plains, respectively. Samples for this exhibit were obtained from the remaining States through correspondence. It was believed that about 180 good half-bushel samples would be secured in this way, though only about 154 were required. Plenty of good material was finally received. The samples, though rather large, were all cheerfully contributed, except in one or two cases. A large number of them were furnished by California through the California Paris Exposition Commission. About one-third of them were of wheat, one-fourth of corn, and the balance of other cereals, all but emmer being represented. The straw samples were also solicited in the field at the same time as the grain samples. A large portion of this latter exhibit was collected from Washington, Oregon, and Idaho by the Oregon Railway and Navigation Company, through its industrial agent, Mr. R. C. Judson. All samples of ear corn were obtained by correspondence, as were also all samples of new varieties and commercial grade samples.

A large number of the pictures exhibited were bromide enlargements of photographs, many of which were taken by Mr. Carleton. Fifteen or more of the pictures of grain fields and harvesting were taken by Mr. A. B. Leckenby, of Tacoma, Wash. The four colored maps were prepared by Mr. Carleton. Two of these illustrated the production of wheat and corn in this country by States, a third showed the average yields of wheat per acre by States, and the fourth showed the distribution by districts of the different natural groups of wheat in the United States.

In all the work of preparing the material, a very large share was borne by Mr. Albert F. Woods, assistant chief of the Division of Vegetable Physiology and Pathology, and by Mr. P. H. Dorsett, of the same division, who has had much experience in exposition work. It required about three months to prepare the material and an enormous amount of work.

All samples showing geographic distribution were put up in flint glass jars, 4 inches in diameter and 1 foot high, in wooden boxes, with 6 by 12 inch glass fronts, or in bags with the tops rolled down, the heaped grain standing above the rolls. Three to five naphthalene moth balls were placed in every sample to prevent the ravages of weevils and other vermin. The export material was simply measured out in half-bushel samples, ready for placing in the gray bags on arrival in Paris.

The straw samples of small grain and the ear-corn samples were fastened on panels made of this compo-board, bordered with molding. The panels, in foot measure, were 1 by 3, 1 by 5, 2 by 5, etc., according to the size and nature of the samples. The straw samples were in bundles of about a large handful and were from 1½ to 3 feet long without the roots. In arranging the ear corn on the panels a few regular designs were followed.

The cereal exhibit as a whole was a very large one, nearly all cereals from all the States being represented. There were fully 600 individual exhibitors, the majority of whom were representative farmers, and over 1,500 separate exhibits were entered, besides pictures and maps. About 1,027 of these samples were in the exhibit showing geographic distribution, 172 in the export exhibit, 180 in the panel exhibit, 77 in the exhibit of new varieties, and 55 in the exhibit of commercial grade samples.

The collection and preparation of so large an exhibit was a great study in itself. Besides being of so much interest to foreigners, it was a source of much information to Americans who did not know before that the cereal industry of this country is of such magnitude. As an illustration of its value in arousing interest in foreign countries, it may be stated that numerous inquiries were made concerning our leading export grain merchants.

As regards recognition by the jury, it may be stated that our cereal exhibit was awarded 6 grand prizes, 9 gold medals, 11 silver medals, and 3 bronze medals.

Respectfully,

B. T. GALLOWAY.

THE CEREAL-PRODUCT COURT.

The exhibitors in this court, where were represented some of the largest milling interests in the United States, covered a space of nearly 1,800 square feet, though a portion of this was occupied by exhibits of the raw cereals. It was intended that the entire court should be occupied by the products of milling interests, but almost at the last moment several important companies, which had asked for and received considerable areas of space, withdrew and refused to exhibit, as a rebuke to France for her high tariff on foreign flours and other milling products. Hence, the necessity for filling the space thus left vacant with other exhibit material.

There were sixteen commercial exhibits of milling products and cereal foods in this series. They were installed in four base pavilion cases, each covering 24 square feet of floor space, and fifteen 3-foot sections of alcove case construction, besides one 2 by 8 foot case in one of the arches of the façade, all of the cases having a height of 8 feet.

The American Cereal Company, Chicago, Ill., made a very original and complete exhibit representing the sixty products manufactured by the various mills of this corporation. It occupied one of the four large pavilion cases in this court and three sections of the alcove case to the south of it. Around the four sides of the larger case were arranged a series of large glass jars of the various milling products, these supporting two solid pyramids of Quaker Oats. In the center of the alcove case appeared the well-known figure of the Quaker presenting a package of oats, and upon either side, upon shelves, were arranged other glass jars of products, and beside each glass jar a sample trade



F-14. NEAR VIEW OF MILLING EXHIBITS, CEREAL-FOOD COURT, SHOWING STYLE OF ALCOVE AND PAVILION CASES EMPLOYED THROUGHOUT THE SPACE, DEPARTMENT OF AGRICULTURE.

package of the particular product, The mills which contributed to the collective exhibit, and which are consolidated under the management of the American Cereal Company, are as follows: The Cascade Mill, Akron, Ohio, wheat farina, Graham, etc.; the Cereal Mill, Akron, Ohio, American steel-cut oatmeal, farinose, cracked wheat, corn meal, etc.; the Empire Mill, Akron, Ohio, hominy, corn meal, and corn flour, rye flour, barley groats; the Imperial Mill, Chicago, Ill., oatmeal, steel-cut and ground; the Scotch Oats Mill, Kansas City, Mo., rolled oats and Scotch rolled oats; the North Star Mills, Cedar Rapids, Iowa, flaked oat groats, corn meal, and corn flour; the Stone Mill Akron, Ohio, Quaker wheat flour and wheat products.

The Minnesota milling exhibits occupied a corresponding space just across the aisle to the west, two companies being represented and their products being installed collectively. These were the Pillsbury-Washburn Company and the Washburn-Crosby Company, both of Minneapolis. In the large pavilion case was displayed a pyramid of one-eighth and one-fourth barrel sacks of flour, contributed by the two companies, together with several heads of barrels and half barrels, showing the trade-mark and lettering of the commercial packages. In the alcove case was displayed, upon plush-covered bases, pyramids of the popular breakfast foods prepared by these companies.

The Alliance Milling Company, of Denton, Tex., made a very simple yet attractive exhibit of flour in a 2-section alcove case just west of the Minnesota exhibits. The regular commercial packages of bags and barrels used by the company were displayed.

In a corresponding 2-section alcove case, just north of the Texas exhibit, was placed the series of wheat flours, breakfast foods, and whole grains shown by the Del Monte Milling Company, of San Francisco. Satin bags, the ordinary commercial bags, paper cartons, and glass jars were employed in the installation of the exhibit.

In the northeast corner of the court, the Sanitas Nut Food Company, and the Battle Creek Sanitarium Health Food Company, of Battle Creek, Mich., made a combined exhibit in one of the 4 by 6-foot pavilion cases. The first-named company showed a large and varied assortment of nut foods, embracing nut meal, brunose, nut oil, malted nuts, protose, and other forms of foods; while the latter exhibited very nearly a full line of their popular cereal products. As a great variety of commercial packages were shown in the large pyramid, which filled the case, the exhibit, as a whole, was very attractive.

In the 4 by 6 foot pavilion case just opposite, the exhibits of two other health-food companies were installed, this case having been divided by a partition. They were the Postum Cereal Company, of Battle Creek, Mich., and the Cereal Machine Company, of Worcester, Mass. The first-named presented a unique installation for their postum-cereal coffee and grape nuts, the original packages being displayed upon wall

brackets, while on the floor of the case was placed a small tea table, prettily set with decorated china, a coffeepot, and portions of cereal foods. In the opposite end of the case was displayed the products of the Cereal Machine Company, such as shredded wheat biscuits, in packages and loose in an immense china punch bowl, with wheat-shred drink, baby food, etc. The installation of this exhibit also was original and interesting, and attracted considerable attention.

The National Starch Manufacturing Company, of New York City, made a very complete and showy exhibit of pearl and other starches, maizena, grape sugar, corn oil, corn-oil cake, etc., which were shown in original packages and in tall glass jars (6 by 24 inches), and which occupied the entire space of one of the 2 by 8 foot cases arranged in the arches of the façade. An exhibit of maizena and pearl starches, in different forms, put up in the original packages, was made in a section of an alcove case near, while a special exhibit of waste products was installed in the court devoted to grasses, forage, and the foods of animals.

Other cereal food exhibits were made by the following firms, which occupied single 3-foot sections of alcove case construction: Health Food Company, New York City, exhibit of wheaten, infant's and invalid's foods, in original packages and glass jars; Sperry Flour Company, San Francisco, Cal., display of infant's food germea, in original packages of various sizes; United States Frumentum Company, Detroit, Mich., frumentum corn flakes in bulk, also display of white-corn flour; Indianapolis Hominy Mills, Indianapolis, Ind., maize products for food and brewers' use, shown in bulk; Cereal Food Company, Decatur, Ill., hulled corn in tins and also in glass; Decatur Cereal Mill Company, Decatur, Ill., various white-corn products, displayed in open pans in a 2 by 6 foot table case.

In connection with the cereal food exhibits should be mentioned the handsome display of the National Biscuit Company, of Chicago and New York City. A large and varied exhibit of the leading forms of biscuits, cakes, and other bakery goods manufactured in the United States was shown in original packages, and occupied five sections of alcove case construction on the main aisle.

Another exhibit of special interest secured by Mr. B. W. Snow, of Chicago, was a most complete collection of the products and by-products of the maize plant, arranged in two small pavilion cases in the center of the cereal court, embracing: Food products—canned corn, corn on the ear, desiccated corn, pop corn and products, breakfast foods as hominy, grits, corn meal, maizena, pancake flour, etc.; products from chemical processes—starches, flourine, corn flour, dextrine, glucose, sugars, feed, gluten meal, chop feed, oil cake, etc., and sample bottles of the products of fermentation and distillation; miscellaneous products—soap, corn oil, rubber substitute, cellulose.



F-20. VIEW ON THIRD FLOOR, AGRICULTURAL ANNEX, WITH CORN KITCHEN AT EXTREME END, LOOKING SOUTHEAST.

smokeless powder, upholstering material, also illustrations of the use of products of the maize stalk in artistic decoration.

THE MAIZE KITCHEN.

While this most popular feature of the American section in Paris, and especially of my department, was installed in another building, it is fitting that I should consider it here, as its purpose was in effect to demonstrate such of our cereal food products as are derived from indian corn or maize. It is unimportant to relate here the story of the difficulties with which the project was surrounded from the outset, or to explain how these were finally overcome. It may be stated, however, that it was not possible to formulate definite plans for carrying out the corn-kitchen idea in Paris in 1900 until late in the fall of 1899, at which time Col. Clark E. Carr and Mr. B. W. Snow were authorized to perfect the scheme in detail, acting under my directions; to prepare plans for installation of the kitchen and, finally, to secure competent chefs and other assistants to report in Paris for duty on the opening of the Exposition. As to the details of the work, as well as the placing of the installation, which were so admirably carried out by Mr. Snow, the story is so well told in his report, which is appended, that little or nothing can be added to it. I need only state, in conclusion, that as a simple advertisement of the fact that American corn products are palatable, wholesome, and cheap, the corn kitchen was a grand success, while it also proved a spectacular exhibit to draw the crowds. As to its immediate effect as a trade maker for maize products in Europe, there is little that can be said at this time, a few weeks after the close of the Exposition, because no data is available on the subject. It is unfortunate that no commercial enterprise has been established in Paris for the sale of these products other than has existed for years in the numerous American and English grocery stores; but even the best of these pay no attention to maize foods, and for the few forms that are kept on sale high prices are demanded, with a chance of deterioration in the product from long keeping. A general depot in Paris for the sale of these products, at reasonable prices, with limited demonstration, as a private venture would, I think, become a success.

While there is no place for many of our American dishes in a French breakfast or dinner menu, the products themselves are available for many modified dishes which, when known, would appeal to the palates of all classes. There should be a large sale for canned sweet corn, hominy, corn meal, corn flour, and the entire line of maize-starch products. One of the most delicate and, at the same time, most thoroughly French puddings I have ever eaten was prepared by a hotel chef from the cornstarch preparation known as maizena. several packages, with directions for use in French and English, having been

given him for trial. In addition to its delicious quality, in its ensemble it was a work of culinary art. I refer to this trifling matter at length in order to illustrate the point that prejudice is largely at the bottom of the nonuse of many of our products, and that when their use and value are thoroughly understood, French chefs will invent an infinite variety of dishes at present unknown to the American cuisine, employing maize foods.

It was very difficult for French visitors to the kitchen to understand how our maize products could be used as food in America by the very wealthy as well as by the very poor. It has been shown how one form of maize was capable of manipulation into a French dinner course fit for an ambassador's table. The poorer classes will only use those products which may be simply prepared in potages, or as vegetable courses in their frugal menus. Our hominy, in different forms, would prove a boon to the French laborer if he knew how to cook this wholesome food; corn meal and corn flour would be less useful to him because he buys all of his bread. But there is no reason why the bakers should not use these products and give the laborer the advantage of a cheaper kind of bread at a lower cost. Commercial enterprise must work out the problem, however, just as commercial enterprise is pushing some of our other cereal food products all over Europe. Not only should the sale of maize products be pushed as a business proposition, but the people must be taught how and when to use them. The matter of high duties on cereal milling products in France may prove an obstacle to a certain extent, but it should be remembered that in the other countries of Europe the duties either are low or there are no duties at all.

The maize kitchen, in connection with my department in Paris, was opened to the public about the middle of May and was formally closed on the 30th of October, on which date a reception was given to "Aunt Jemima," whose corn griddle cakes in Paris had made her famous. It has been intimated that "Aunt Jemima" kept the tally of the visitors to the kitchen by means of a system of her own, in some way connected with the cooking of the griddle cakes. However, the official record of the number of people fed at the corn-kitchen counter sums up for the period of the Exposition about 114,000, the largest number fed in one day (of six hours) being 2,365. Two guards were required to regulate the entrance and exit of visitors during the latter months, and it is interesting to record that on many days people were turned away who could not be served. However popular the corn kitchen may have been with foreigners, it goes without saying that it was immensely popular with the American abroad, and particularly with the American who had been living abroad and who had not tasted corn bread or corn cakes for months or years.

The following is the report of Mr. B. W. Snow on the maize kitchen:

I beg to submit the following report concerning the performance of my duties in connection with the corn kitchen exhibit in the Department of Agriculture and Food Products.

Upon your recommendation, the Commissioner-General appointed Col. Clark E. Carr, of Galesburg, Ill., and myself as experts to arrange for the maintenance of the corn kitchen, my commission dating from January 1, 1900, and that of Colonel Carr from February 1. Acting under your instructions Colonel Carr and myself divided our duties, I assuming charge of the mechanical details of arranging for and setting up the kitchen, securing the supplies and arranging for their delivery in Paris at such times during the continuance of the Exposition as they might be needed. Colonel Carr assumed the duty of advertising and exploiting the work both at home and abroad, the management of the kitchen after its establishment, and the work necessary to induce importing houses to handle corn-food products. In the selection of names to be recommended to you for appointment as employees we assumed joint responsibility.

As soon as a plan of the space allotted to the kitchen was secured, which was furnished promptly after my appointment, the details of the kitchen arrangement were carefully worked out, although the space was so limited that it was difficult to provide the necessary culinary conveniences and at the same time leave sufficient room for the general public. In devising plans for the best possible utilization of the space, I visited many restaurants and lunch rooms, securing measurements and investigating the latest conveniences in use in such places. When the rough sketch of the counter, stands, tables, shelves, drawers, etc., desired for the kitchen had been completed, I submitted them to you. In this connection I desire here to acknowledge my indebtedness to Mr. A. W. Sparks, the draftsman of your department, for the intelligent manner in which he perfected his drawings from the rough data which was submitted.

The next step, taken jointly with Colonel Carr, was to select and recommend for appointment as head chef Mr. Henry Weiss, head chef of the Auditorium Hotel, Chicago. Through the kindness of Mr. John C. Roth, steward of this hotel, we were enabled to secure Mr. Weiss for the position, despite the fact that the salary offered was but little more than one-half of that which he received from the hotel, but his permanent position was to be open to him after the close of the Exposition. Upon your acceptance of this recommendation I arranged with Mr. Roth to have Mr. Weiss experiment with different dishes of corn foods, serving one or more corn dishes each day to the guests of the hotel from about January 15 until March 1, the date on which the head chef was ordered to start for Paris. During this period I lunched frequently with Mr. Roth in order to test and criticise the dishes served.

During the same period Mr. Roth assisted me in determining the quantity and character of culinary utensils required, and in their purchase I had the benefit of his experience. The ranges were furnished by George M. Clark & Co., Chicago, who donated all profit on the goods, billing them to the corn kitchen at bare cost of manufacture. The copper and most of the iron cooking utensils were furnished at a reduction from regular prices by the Bramhall du Parquet Company, Chicago.

After an extensive correspondence with all the leading manufacturers of corn foods, explaining the character of the effort to popularize these products, nearly every company responded by making a donation of such of its products as might be wanted for demonstration during the life of the Exposition. In a few cases the donation was limited to a definite quantity, but as a rule the giving was in the most liberal spirit, the common expression being "we will forward our goods in any quantity required, with shipment at any time desired during the Exposition."

The firms making these contributions, and whose goods were used during the oper-

ation of the corn kitchen, were: American Cereal Company, Chicago, Ill.; Cereal Food Company, Peoria, Ill.; Decatur Cereal Mill Company, Decatur, Ill.; Health Food Company, New York; the Hudnut Company, Terre Haute, Ind.; Indianapolis Hominy Mills, Indianapolis, Ind.; National Starch Manufacturing Company, New York; Patent Cereal Company, Geneva, N. Y.; United States Frumentum Company, Detroit, Mich.

The only materials purchased for use in the culinary work of the kitchen were miscellaneous groceries and such products as are not produced from corn.

In accordance with your instructions, I arrived in Paris the third week in March, to superintend the setting up of the kitchen. Here I assumed charge of the labor of perfecting the mechanical details, putting in gas and plumbing, setting up the counters, shelves, and other fittings, which, upon your order, had been built in the United States in accordance with the plans I had furnished. I also arranged for such additional facilities as could be best secured in Paris, purchase of chinaware, glassware, etc. The long delay in the completion of buildings and other delays in French administration, and the difficulty in getting freight material delivered promptly, made it impossible to have the kitchen completed by the day officially named for the opening of the Exposition. I am pleased to state, however, that the kitchen was ready to be turned over to those who were to manage it before any other feature of the American exhibit was formally dedicated to the public. My active connection with the management of the kitchen ceased when it was formally dedicated to the public on May 17, at which time all mechanical details were completed.

In rendering this report of my connection with this feature of your department, I desire to acknowledge my indebtedness to Mr. William Halley, chief carpenter, and Mr. Sparks, draftsman, for valuable assistance. I desire also to acknowledge the unfailing courtesy and substantial aid which at all times I received from yourself and Mr. J. L. Farmer, assistant director of agriculture, and to the general staff of your office.

It is proper at this time also to acknowledge the earnest and active interest which, from the first, the Commissioner-General displayed in the success of the corn kitchen, an interest which not only made possible the effort but extended to the practical details by which the work was carried out.

B. W. SNOW,
Expert, Group X.

MISCELLANEOUS VEGETABLE PRODUCTS.

In this section, which covered about 1,200 square feet of floor space, were arranged all of the exhibits of canned, preserved, and dried fruits, canned vegetables, edible and nonedible vegetable oils, pickles, and relishes, salt, etc., which occupied four 4 by 6 feet pavilion cases and forty-five sections of alcove cases, equal to 135 running feet of case construction 8 feet high. The exhibits of fruits in tin and glass were as follows:

J. H. Flickinger Company, San Jose, Cal.: Preserved pears, peaches, plums, cherries, etc., in tin and glass. A fine display occupying half of a 4 by 6 feet pavilion case, the exhibit being arranged in pyramidal form.

California Canneries, Limited: Preserved pears, peaches, etc., in tins, and an exhibit of jams in glass, solidly displayed in the other half of above 4 by 6 feet pavilion case.

The Hickmott Canning Company, San Francisco, Cal.: Canned

asparagus in glass jars. Received through the California Paris Exposition commission.

Erie Preserving Company, Buffalo, N. Y.: Canned fruits and vegetables; a large and fine display of the goods put up by this house, occupying two sections of an alcove case on the main aisle and one section in another location devoted to apples put up in large cans.

The Paul Taylor Brown Company, New York City: This firm made an attractive display of vegetables preserved in tin.

The Geneva Preserving Company, Geneva, N. Y., sent an interesting exhibit of canned fruits and vegetables, which were arranged in solid form in an alcove case on the main aisle.

The Joseph Campbell Preserve Company, Camden, N. J., sent a small but very attractive exhibit of their unrivaled soups and catsups, which occupied a prominent corner section of an alcove case on the main aisle, the corresponding corner section being occupied by the display made by the Welch Grape Juice Company, of Westfield, N. J. A feature of this display was the use of artificial grape leaves and grapes for decorative purposes.

Secretary of Agriculture, Washington, D. C.: A small collective exhibit of canned and preserved fruits and vegetables, soups, catsups, etc., contributed by the following firms, which did not desire to enter individual commercial exhibits:

Curtiee Brothers Company, Rochester, N. Y.

Kemp, Day & Co., New York City.

In the series of dried-fruit exhibits should be mentioned most prominently the collective display made by the State of California through the California Paris Exposition Commission. The display occupied two sections of alcove-case construction backing the cereal court and six sections in another location near at hand. The exhibits were attractively installed with decorative material, photographs, etc., and deserve especial mention. The contributors to the collectivity were as follows:

Castle Brothers, Fresno, Cal.

N. P. Chipman, Redbluff, Cal.

D. S. Cone, Redbluff, Cal.

Mrs. M. Duncan, Redbluff, Cal.

J. O. Ames, Redbluff, Cal.

O. M. Anderson, Redbluff, Cal.

G. W. Barr, Fresno, Cal.

W. Forsythe, Fresno, Cal.

Fresno Chamber of Commerce, Fresno, Cal.

A. L. Hobbs, Fresno, Cal.

B. F. Howell, Redbluff, Cal.

J. B. Inderriaden, Fresno, Cal.

N. P. Jensen, Fresno, Cal.

Kimble Estate, Fresno, Cal.

W. L. Lewis, Fresno, Cal.

D. W. Lewis, Fresno, Cal.

Los Angeles Chamber of Commerce, Los Angeles, Cal.

Loud & Gerling, Pomona, Cal.

Malaga Cooperative Company, Fresno, Cal.

Malone & Smith, Ontario, Cal.

Marcariar & Co., Fresno, Cal.

A. C. Miley, Fresno, Cal.

Minnewawa Vineyard, Fresno, Cal.

Noble Brothers, Fresno, Cal.

Phoenix Packing Company, Fresno, Cal.

E. W. Runyon, Redbluff, Cal.

San Gabriel Fruit Company, San Gabriel, Cal.

Santa Ana Chamber of Commerce, Santa Ana, Cal.

D. S. Trowbridge, Fresno, Cal.

Lewis Viau, Fresno, Cal.

Voice Brothers, Fresno, Cal.

G. W. Winkle, Fresno, Cal.

Zimmerman Brothers, Fresno, Cal.

The New York State Paris commission also sent in a unique exhibit of dried fruits, which was in strong contrast to the above, there being no attempt at decorative features or color display. The samples were put up in neat glass-covered boxes about 5 by 8 inches square, these filling the walls of five sections of alcove-case construction. The exhibit was collected by L. M. Blakely, of Lyons, N. Y., and represented the following firms:

Petrie Fruit Company, Rochester, N. Y.

Brown Brothers, Dispatch, N. Y.

W. E. Schaeffer, Lockport, N. Y.

Exhibitors of Wayne County, Wayne County, N. Y.

Upon a panel 21 feet long and 6 feet high, extending through the center of this section, was displayed a series of photographic enlargements illustrative of the different industries represented in the section.

Passing from the exhibits of canned fruits and vegetables to the displays, of pickles, condiments, etc., the exhibit of the H. J. Heinz Company attracted attention. Limited space will not permit enumerating the entire list of products exhibited by this company; suffice it to say that it included various forms of pickled goods, baked beans, etc. The exhibit was well installed in a 4 by 6 foot pavilion case, a pleasing effect being produced by the use of plate-glass mirrors. This concern also demonstrated its products on the third floor of the Agricultural Annex, near the Maize Kitchen.

Another attractive exhibit, placed near the above, was that of the California Packing Company. A feature of this exhibit was the placing in a central position of four immense glass jars of as many forms

of pickles. The exhibit occupied three sections of alcove-case construction.

W. D. Richardson, Fredericksburg, Va.: An exhibit of pickles and similar products put up by this house, in glass jars.

Other exhibits were made by the Bouillon Stock Manufacturing Company, Chicago, Ill.; Wahl's vegetable bouillon stock, in jars and bottles; Oscar, of the Waldorf-Astoria, New York City—Oscar's sauce in glass jars; and George Williams, Los Angeles, Cal., Williams's sauce in bottles.

In the section devoted to edible and nonedible oils there were a number of very interesting exhibits. One of the largest and most prominent was the exhibit of the American Cotton Oil Company of New York City, representing the cotton-oil industry of America. It was installed in a 4 by 6 foot pavilion case near the wine section, and comprised a full line of crude and refined oils and oil products, arranged in large and small glass jars against a pyramidal structure of plate-glass mirrors. The company also exhibited such waste products as oil cake and meal in the section devoted to the foods of animals.

Another carefully prepared and interesting exhibit was that made by A. M. Todd, of Kalamazoo, Mich., illustrating the manufacture of essential oils, which filled two sections of an alcove case, covering about 2 by 6 feet of floor space. The collection embraced a series of volatile oils in bottles, arranged in groups, together with a model of a distilling plant used in their production. The exhibit was enhanced by pressed and handsomely mounted specimens of various aromatic and medicinal plants and herbs and was accompanied by a series of photographs.

In an adjoining section, in a space of 2 by 3 by 5 feet, were shown four exhibits of California olive oil, handsomely installed on as many shelves. The firms represented in this collection were:

Ackman & Tuftly, Los Angeles, Cal.

The California Packing Company, San Francisco, Cal.

Elwood Cooper, Santa Barbara, Cal.

Ekman & Stow, Oroville, Cal.

The exhibit of olives and mustard preparations was shown in another alcove case near, representing Charles Gulden, of New York City. The Seville Packing Company, of New York, showed a series of olives and pim-olas products.

Charles U. Shepard, of Summerville, S. C., was represented by a series of samples of American tea, grown and prepared on the Pinehurst farm. The exhibit comprised trade packages of green and black teas, with other samples in glass illustrating the preparation of these teas. A set of photographs completed the exhibit.

Through the California commission an exhibit of ten miniature bales of hops were received as specimens of the product of the Horst

Brothers, of Hortsville, Cal., there being a bale for each locality where the hop farms of this concern are located..

Several exhibits of salt were displayed in the upper part of the case devoted to hops, as follows:

Crystal Salt Works, Los Angeles, Cal.: Table salt in glass jars, half-ground salt for table or dairy.

The Pioneer Salt Works, Mount Eden, Cal.: Table salt; also rock and coarse salts for manufacturing and dairy purposes.

The Redondo Salt Works.

The Southern California Salt Works, Los Angeles.

The Union Pacific Salt Works, San Francisco, Cal.

THE WINE AND LIQUOR COURT.

The exhibits in this section covered an area of about 1,500 square feet at the extreme eastern end of the main space, between the façade and the rear aisle. They filled four pavilion cases measuring 2 by 9 feet of floor space each, two pavilion cases measuring 6 by 6 feet, and about forty 3-foot sections of alcove case construction, besides one 2 by 6 case built into an arch of the façade. The exhibit as a whole, which was collected by H. W. Wiley, chemist in chief of the United States Department of Agriculture, was the largest and most representative collection of wines and liquors ever sent to any foreign exposition.

In working out the installation of this material, the exhibits of each class represented were assembled together as far as possible, with a further grouping in relation to locality of production. The cases in which the exhibits were installed were for the most part without bases, which allowed full installation from the floor to the glass ceiling above. The plan of installation followed for the wine exhibits was a scheme of shelving which gave four compartments between partitions in each case and allowed for three tiers of bottles in each compartment, arranged upon steps. This resulted in a compact installation, which was necessitated by the limited space available for the large amount of material sent to Paris, but at the same time produced a pleasing and harmonious effect and was advantageous for study. There were about seventy exhibits of this series, nearly fifty of which were from California, seven from New York, and the remainder from Ohio, District of Columbia, Virginia, North Carolina, and Florida. It was distinctively a commercial exhibit, and the individuality of every exhibitor was preserved, whether he occupied several case sections or only two shelves in one section.

The material exhibited on the space was only a part of the collection, however, as a duplicate series of all wines and liquors was kept in boxes in a wine cellar located under the Director's office, for purposes of demonstration. Here Europeans and Americans were afforded the opportunity to test such wines as they might be interested in, and it



F-11. VIEW OF WINE AND LIQUOR COURT, LOOKING EAST, DEPARTMENT OF AGRICULTURE.

may be said that many American visitors learned for the first time that good native wines were produced in their own country.

There were fourteen exhibits of whiskey, cordials, etc., sent to Paris by leading houses. These were more elaborately installed than the preceding, the larger part of the collection having been displayed in two handsome cases, each 6 feet square and 8 feet high, facing upon two main aisles. The larger exhibits were those of G. T. Hueblein Brothers, Hartford, Conn., American Crest whisky and Club cocktails; the Cook & Bernheimer Company, New York City, Old Valley and Mount Vernon whiskeys and Gold Lion cocktails; J. W. McCulloch, Owensboro, Ky., Green River Bourbon whisky; David Netter & Co., Philadelphia, Telegram rye whisky; Bernheim Brothers, Louisville, Ky., Bourbon whiskeys; Joseph Beck & Co., Beckmore whisky. Other smaller exhibits were made by the Large Distilling Company, Pittsburg; the Maryland Distilling Company, Baltimore; the Victor Malt Whiskey Company, San Francisco; Steinhart Bros. & Co., New York City; the Meadville Distilling Company, Vallonia, Pa., and Stitzel Brothers, Louisville.

The Rheinstrom, Bettman & Johnson Company, of Cincinnati, Ohio, had a unique exhibit of liqueurs, cordials, bitters, etc., their large and varied line being shown in a case built into one of the arches of the façade, and the material arranged upon a handsome piece of cabinet installation of white enameled wood and plate glass.

The exhibits in class 61 attracted a great deal of attention, the cocktails especially, which were generally liked by foreigners, though regarded as an American novelty. Several of the exhibitors in this class had considered the matter of demonstration in preparing their exhibits, and included supplies of miniature bottles, each holding a single portion of liquor. By this means "samples" could be taken from the space by interested visitors.

H. W. Wiley, the wine expert, was present with us in Paris for several months, and performed efficient service in making known to the French people, especially, the high quality of our liquor products. The advantage the United States will receive through this thorough exploitation, not only of class 61 products but of the wines as well, is indicated by the large number of awards received in the wine and liquor group of exhibits.

At the close of the Exposition the larger portion of the whisky material was disposed of by order of the exhibitors, and therefore left in Paris. A few exhibits were returned to the houses which contributed them.

The exhibits of beers, ales, cider, ginger ale, etc., represented twenty-one American breweries and bottling establishments, and were installed, for the most part, in a single case measuring 6 by 15 feet and 10 feet high. On account of the compact installation, the showy

labels on the bottles, and the prominent position of the case, this was one of the most striking collective exhibits in the court. Ten States were represented, there being four exhibits from New York City and Brooklyn and one from Rochester, N. Y.; one from New Haven, Conn.; one each from Newark and Jersey City, N. J.; two from Chicago, Ill.; and one each from Indianapolis, Ind.; Detroit, Mich.; La Crosse, Wis.; St. Louis, Mo.; San Francisco and Los Angeles, Cal.; Sagertown and Clearfield, Pa., and the District of Columbia. The names and addresses of these exhibitors will be found in the catalogue on other pages.

The mineral waters, which were also installed in my department, comprised eighteen exhibits. They included both charged and natural waters, although only the natural waters were considered as belonging to class 62, the charged waters being placed in the hygiene group.

The exhibits were mainly installed in a small court of about 150 square feet under the entresol gallery, between the eastern staircase and the director's office, though a part of the display occupied about 40 running feet of alcove, case construction in the sugar and confectionery court. The waters were shown in great variety, including both table and medicinal waters, and represented seven States, as follows: Massachusetts, New York, Virginia, West Virginia, Indiana, Missouri, and California.

The report of H. W. Wiley, wine expert, is presented, as follows:

I was charged by the Secretary of Agriculture and the Director of Agriculture of the Paris Exposition with the collection and preparation of exhibits from the United States illustrating the industries engaged in producing beverages, as well as sugar and fertilizers.

The beverages which I was commissioned to collect were fermented beverages, including wines, beers, ales, etc., and distilled beverages, including alcohol, whisky, and brandy of different kinds, and mineral waters, both naturally and artificially charged.

The wine industry of the United States extends over a large area. The principal point of production is the State of California, but there are large areas in other parts of the country where wines of most excellent quality are made. Among these may be mentioned Virginia, New York, Ohio, and Florida.

The still wines of California are justly celebrated. Three different types are represented by the various products, although the varieties of these types are extremely numerous. The red wines, or claret type, are produced in all parts of the State, but principally in the central and northern portions. These wines represent not only the light-bodied types, which we know as the Bordeaux wines, but also the heavier-bodied wines represented by the Burgundy wines in France.

California wines are distinguished from their similar European types by having a slightly greater quantity of alcohol, a deeper color, and a larger quantity of astringent or tannic principle.

The second type produced in California in great abundance is the so-called white wines, or wines with an amber tint. The sauterne type is one of the most common of these, and many varieties of the sauterne type produced in California are equal to or superior in excellence to similar types in Europe.

The Rhine-wine type also belongs to the same class, and in these wines the acidity is higher and the body lighter, making a most excellent light table drink.

The third type of wines produced in great quantities in California is known locally as sweet wines and in France by the term "vin liqueurs." These wines are artificially fortified; that is, they have an additional quantity of alcohol, derived from the distillation of other wines, so as to bring the content of alcohol up from 16 to 20 per cent. The first fermentation of these wines is stopped before all the sugar is converted into alcohol, and thus the wines have a decidedly sweet taste.

With the collaboration of the California commission of the Paris Exposition I was able to secure typical samples of all these different wines, most of them of high quality and all sound in every particular. Unfortunately, in transportation to Washington during the winter some of these wines were exposed to a low temperature—below the freezing point, in fact—and were so injured that they were not allowed to go into competition. The quantity thus retained from competition, however, was not large in comparison with the whole amount.

These sweet wines are produced principally in the central and southern portions of the State. The climate of California is peculiarly adapted to the production of a grape rich in sugar. During the summer months there is almost constant sunshine and absence of rainfall, both these conditions leading to the development of a high percentage of sugar. It is for this reason that wines produced in all parts of California have a higher alcoholic strength than similar types of wines produced in France or Germany, and correspond more nearly to similar types produced in Spain and Italy, where the climatic conditions are more nearly those of California.

The viticultural industry in California is rapidly being placed upon a scientific basis, and there is a tendency to concentrate the production of wines under a general direction, rather than to leave it to the individual control of the smaller vineyards. The necessity for this condition of affairs in California is greater than in France, because it is difficult to control the temperature of fermentation in a climate like that of California, where, during the vintage, excessively hot days are experienced. Thus in large cellars, under a common general control, the conditions of fermentation are such as to produce a better character of wine than can usually be secured in smaller vineyards. For this reason a tendency has developed in the last few years among the viticulturists of California to produce grapes for sale to large wineries. While this condition must exclude the possibility of developing an extremely fine grade of wine, made in small quantities, it surely tends to make the ordinary grades of wine much better and of more uniform quality. For this reason, if California can be said to produce a *vin ordinaire*, it must be conceded that this wine is far superior to that bearing the same name which is dispensed in France.

In Virginia a very high grade of red wine is produced which has a body and color far superior to most wines of this class. This Virginia wine, although it has un *goût sauvage*, attracted great attention among the French experts, who pronounced it one of the finest wines for blending with their red wines that had yet been brought to their notice.

Not only are large quantities of still wines produced in New York and Ohio, but in these localities we find the principal production of sparkling wines in the United States. These wines of the champagne type have a rich aroma and fine flavor, and are made in accordance with the best established principles of the production of natural sparkling wines. These also attracted most favorable attention, even to the extent of raising a doubt in the minds of some of the experts as to the locality of their production.

In all, wines representing seventy different vineyards and cellars were collected for exhibition. About fifteen samples of the whole number were so injured in transport as to be withdrawn from competition, leaving fifty-seven as the total number of competing wines. Of these a little over 90 per cent received awards or honorable mention, which it is believed is a higher percentage than that of the wines of any other country.

The result of the exhibition of our wines in Paris will benefit American viticul-

turists in two principal ways. First, the attention of European consumers of wine has been most favorably called to the excellence of the American product. Four of the principal experts on the jury, an Englishman and three Frenchmen, all large dealers in wines, asked for a special test of the American wines, for the purpose of introducing them commercially into their trade. This was not so peculiar in regard to the English member of the jury, since already American wines are finding a most excellent London market, which is constantly increasing. It is rather curious, however, to find the French dealers anxious to get hold of American wines, and the reason, which was finally discovered, is that the superior color and astringent principles of our American wines make them peculiarly suitable for blending with the lighter-colored and lighter-bodied French wines, to the mutual benefit of both. The only objection which can be urged to such a blending is the danger that these new wines will be offered for sale as pure French wines, and thus the American wine will get no credit and the French dealer will get practically all the profit.

The second way in which this Exposition will benefit American viticulturists is in giving American wines a better standard at home. It is a very common expression among American wine drinkers that our own domestic wines are not fit for consumption. Such an opinion can arise only from prejudice or ignorance; but now that the highest body of experts in the world has pronounced our wines of most excellent character, there can no longer be any excuse for their being repudiated at home.

As a means of improving the financial side of American viticulture, the extension of home consumption is the most promising, and with the reputation which our wines will now bear, after having passed through the ordeal of a competitive examination, there will be less difficulty in securing their recognition on our own tables.

Our exhibit of brandies was not so extensive nor so representative as that of wines, nor did our samples fare so well at the hands of the jury. Unfortunately, most of the samples were not of a sufficient age to have acquired mellowness and the aroma which is so prized in higher grade brandies. They were, however, all absolutely pure, made by the distillation of wines, and this is more than can be said of many of the alleged brandies and cognacs imported into this from foreign countries. The American brandies were fairly well represented in the exhibit. Most of the samples came from California. There were, however, samples from Ohio, New York, Virginia, and Florida. The Florida brandies received the highest recognition in the awards and were of most excellent quality. The other brandies were of very high grade, but were not so favorably considered by the experts.

One point in regard to the brandy industry is the well-known fact of the very extensive adulteration of our imported brandies. It is quite certain that many for which high prices are paid are practically free of alcohol derived from the distillation of wine and are mixtures of alcohol, derived from other sources, with coloring and flavoring matters. The development of our own brandy industry would at least secure us a pure article, and, after the lapse of a sufficient time to allow the proper ripening, an article of most excellent quality.

Our exhibits of whiskies and cocktails, though not numerous, were fairly typical of the products of the country. Some of the best brands of rye and indian-corn whisky made in the country were on exhibition, and all the whiskies were of exceptionally high quality. This exhibit has the unique merit, I believe, of being the only one containing more than one display in which every sample secured an award. One-third of the samples received gold medals and all the others silver or bronze. The whisky exhibits were most attractively arranged and commanded a great deal of attention.

Bourbon whisky—that is, whisky made from indian corn—is almost unknown as an article of consumption in Europe, where, in fact, outside of the British Kingdom, whisky of any kind is not very commonly found. The alcoholic drink of the Ger-

mans, known as schnapps, and that of the Russians, known as vodki, can hardly be regarded as whiskies, but only concoctions of diluted alcohol.

Whether or not the exhibition of our whiskies will command a European market will be a matter for the future to decide, but it is gratifying to our distillers to know that so fine a showing was made and so much attention called to this product.

The exhibition of cocktails excited even more attention, since the reputation of this country for making mixed drinks is well known everywhere in Europe. The chief varieties of cocktails were exhibited in quart bottles, or bottles of smaller size for distribution to the experts. These mixtures were much admired by the experts who examined them, and, on account of their novelty, received an unusual share of attention. All of the cocktails exhibited received prizes.

Our exhibits of ales, beers, ciders, fermented drinks, and mineral waters represented some of the best products of the United States, although by no means including the majority of the brewers. In fact, it would have been impossible to find space for an exhibit if all the brewers had wished to take part. Typical breweries, however, were represented from all parts of the country, from the State of New York to the State of Washington. In all, thirty-five different exhibits in this class were installed, making quite an attractive display and receiving a great deal of attention from visitors.

Our samples of beer were placed at a disadvantage, since, on account of the distance and difficulty of transportation, fresh samples in the wood could not be sent for examination by the jury. It was stipulated in the collection of the samples that none of them should contain any antiseptic substance. Our beers were therefore exhibited in bottles which had been sterilized at a somewhat higher temperature than was usually employed. The keeping qualities of the beers were fine. At the time of the examination some of them had been in bottles for nearly eight months, and yet were found fresh and sound. It would have been better, however, if fresh samples in the wood could have been sent for examination, and thus our beers could have been brought into proper competition with those of French origin and those sent from Germany. In spite of this handicap, however, the result of the inspection of our beers was quite satisfactory.

In general, it may be said that the exhibits which I collected, while not so extensive as I had hoped they might be, on account of the limited space, were thoroughly typical of the industries which they represented, and gave to the careful student a distinct idea of the character of those industries and their magnitude.

H. W. WILEY,

Expert for the Collection of Beverages, Sugars, and Fertilizers.

THE SUGAR AND CONFECTIONERY COURT.

The exhibit of sugars and sugar products was assigned a space of about 150 square feet under the entresol gallery, directly west of the office. It was installed in two base pavilion cases, 3 by 9 feet floor space, one pavilion case, 6 by 6 feet, and about 27 running feet of alcove-case construction. While the exhibit as a whole was much smaller than was contemplated in the general exhibit scheme, it made an interesting and representative illustration of our resources in this class.

The sugar exhibit included samples of the product of the sugar cane of Florida by the different processes, among which the yellow clarified sugar, which is one of the standard grades produced in Louisiana, commanded great attention. The beet-sugar industry was represented

by typical products showing first the beet and then all the successive steps of manufacture to the finished sugar. The collection numbered five exhibits, as follows:

The Louisiana Sugar Planters' Association, of New Orleans: Cane sugar, molasses, massaquite, etc.; a large and comprehensive exhibit of cane products handsomely installed in globe-form glass jars.

The Spreckels Sugar Company, Salinas, Cal.: A superb display in 8 by 30 inch glass jars and globe-form glass jars, illustrating the beet-sugar industry of California. The exhibit occupied one-half of a 3 by 9 foot pavilion case.

L. M. Soniat, Dorceyville, La., sent cane sugar, molasses, etc.

Seth Kinney & Son, Morristown, Minn., contributed an interesting exhibit of sorghum molasses.

Hayne & Whitaker, of New York, sent a handsome though small exhibit of milk sugar.

There were three exhibits of maple sirup, but none of maple sugar. The collection, while illustrating fully this distinctively American product, did not attract the interest it should have done, as the product was not understood, and even by the jury was considered more of a novelty than an important commercial product. Maple sirup was daily "demonstrated," however, in the corn kitchen, and thousands of foreigners had the opportunity of tasting it in connection with hot griddlecakes and other prepared food. But as the American griddlecake is a novelty to European palates, it follows that a place must be made for maple sirup before it will have a large sale. The exhibits were as follows:

The Towle Maple Syrup Company, St. Paul, Minn.: "Log Cabin" brand of sirup, in tins and glass.

The Welch Brothers Maple Company, Burlington, Vt.: Maple sirup in glass and tin, showing trade packages.

Thrasher, Ohio: A considerable exhibit in maple sirup, sugar, and models of apparatus employed in manufacture. A part of this exhibit was unfortunately lost in transit to Paris and was not received on the space until near the close of the Exposition.

The three exhibits occupied 15 running feet of wall-case construction, forming an attractive piece of installation.

The confectionery exhibits were confined to two firms, the Pan Confection Company, Chicago, and Dilling & Co., Marion, Ind., both of which showed hard candies chiefly, put up in ornamental sealed glass jars. They were effectively installed in the form of pyramidal structures built up with plate-glass shelving, and were among the most striking and handsome exhibits in the agricultural section.

It was intended that the display of confectionery should be large and complete, and should represent leading candy houses of America. It was discovered, however, that these firms, which had built up repu-

tations on fine confections, "made fresh every day," were averse to sending exhibits which in a few weeks would have suffered deterioration, and which before the close of the Exposition would have become unsightly and unpalatable, especially as they were required to be forwarded to Paris several months before the opening of the Exposition. It is to be regretted that fresh American candies, particularly the soft confections, could not have been shown in Paris from patriotic motives, even if not to induce trade. As it was, there were many inquiries for American confectionery from those desiring to purchase.

Crystallized products, which were also exhibited in this class, were mainly received from California. These were confined to two exhibits, that of Bishop & Co., Los Angeles, Cal., a large exhibit of crystallized, glazed, and preserved fruits, shown loose and also in commercial packages; and a very small but unique exhibit of crystallized rose leaves and violets from Bessie Marsh, South Pasadena, Cal.

The Sen-Sen Company, of Rochester, N. Y., also exhibited in this court chewing gum and other goods manufactured by it, the installation being original and attractive.

The Walter Baker Company's exhibit, which should have been placed in this court, had to be installed on the main space, where a full 4 by 6 foot pavilion case could be allotted for their superb series of products, which was large and varied. A description of these well-known products is not necessary here, though it should be stated that their exhibit included everything of importance manufactured by the company. The installation was their own, first set up at the factory and photographed, so that it was possible to exactly reproduce it in the space in Paris. This was the only American chocolate exhibit shown in the American section.

THE FERTILIZER COURT.

The fertilizers, also collected by H. W. Wiley, the expert, occupied about 54 running feet of wall-case construction, 7 feet high, in the center of the entresol gallery. It was originally intended that the collection should fill the entire space of about 800 square feet which had been allotted to it, but failure to secure several important exhibits which had been provided for left a vacant area of floor space in the court, in which was subsequently placed a handsome rug, a table, and chairs for the use of visitors, and also for office purposes when occasionally so required.

There were twelve exhibits of fertilizers, and while the collection as a whole was small, the products exhibited were typical of this great industry in the United States. Many of the exhibits were handsomely displayed in glass, though some were shown in original packages and others loose.

Samples of our natural phosphates, representing all the different

varieties, were placed on exhibition. One slab weighing over a ton showed the magnitude of the pieces of phosphate rock with which this country abounds. The different kinds of pebble phosphate dredged from the rivers of Florida were also on exhibition, as well as the soft phosphates of that State. The phosphates of Tennessee and South Carolina were represented by numerous exhibits, each of which was accompanied by an analysis of the product on exhibition.

Many manufactured phosphates and products of our slaughterhouses were fully represented, showing all the different kinds of nitrogenous fertilizers recovered from the waste of slaughterhouses and adapted to use in the fields. The mixed fertilizers, representing the different types employed for different purposes, as, for instance, for the intensive culture of the gardens near cities and the field culture of growing maize and wheat, were also exhibited. There is perhaps no other country so rich in natural phosphates as the United States, and our exhibits of phosphatic materials in the raw state, and of the preparations from the refuse of the slaughterhouses, were more typical than these of any other country exporting similar products.

THE FORAGE AND ANIMAL-FOODS COURT.

The area of this court, which was located north of the main aisle under the entresol gallery, was about 500 square feet. It was filled with mixed Government collective and commercial exhibits, brought together by F. Lamson-Scribner, assisted by Mr. T. A. Williams, both of the division of agrostology of the United States Department of Agriculture.

The commercial exhibits related to feed stuffs, seeds of forage plants, and stock remedies. One of the largest exhibits was that made by the Albert Dickinson Company, of Chicago, of commercial forage seeds, artistically installed in glass jars and linen duck bags; it occupied two sections of a 3 by 12 pavilion case. The other two sections were filled by the exhibit of the International Food Company, of Minneapolis, cattle foods, stock remedies, etc., and an interesting exhibit of prepared dog and poultry foods, remedies, etc., made by Spratt's Patent, Limited, New York City.

The A. Smurthwaite Produce Company, of Ogden, Utah, made a fine exhibit of alfalfa, timothy, and other forage seeds, arranged in the top of a table case in the center of the space.

Trumbull & Beebe, San Francisco, Cal., sent a large exhibit of legumes, grass, and other seeds, which, for lack of space in this section, was installed just across the main aisle in one of the largest alcove cases in the section devoted to miscellaneous vegetable products.

A series of stock and poultry foods, some of which were the waste products of other industries, made an interesting collection in this special class. Bennett & Millett, of Gouverneur, N. Y., displayed

ground-clover poultry food. The National Starch Company exhibited waste products of the milling industry. The American Cotton Oil Company (from the Union Oil Company, New Orleans), made a fine exhibit of cotton-seed cake, meal, etc. Scott & Magner, San Francisco, contributed stock foods, baled hay, etc., arranged in a model barn. (This exhibit, on account of its large size, was placed in the entresol gallery above the tobacco exhibit.) George P. Vosbrink, of Chicago, exhibited a line of bird foods, and the Glucose Sugar Refining Company, also of Chicago, gluten and corn-meal cattle foods. This completes the account of the commercial exhibit. The story of the Government collective exhibit, which was prepared by the Division of Agrostology of the Department of Agriculture, is herewith appended.

REPORT OF F. LAMSON-SCRIBNER.

The collection and preparation of the exhibit of animal foods in the United States exhibit at the Paris Exposition was assigned to the chief of the Division of Agrostology in the Department of Agriculture. The object of the exhibit was to illustrate the material and commercial resources of the United States in supplying grasses, grains, and various prepared materials and by-products of plants used as food for animals. As in the case of other exhibitions made by the Department, this was divided into two classes—first, the commercial exhibit, consisting of material sent by individual firms for prize competition, and second, the general collective exhibit made by the division or contributed by its correspondents. The former included a collection of the seeds of grasses and forage crops offered in the markets and animal foods of all kinds made directly from various cereal crops, or by-products in the manufacture of sugar, cotton-seed oil, linseed oil, and other commodities. The latter consisted of the more important grasses and forage plants and the various kinds of forage made from them, seeds of both native and introduced varieties, and photographs illustrating the habits of growth of the different plants, and the methods of cultivating, harvesting, and utilizing them.

The commercial exhibit.—A full list of the material forming the commercial exhibit of animal foods with the names of the exhibitors is presented elsewhere. These exhibits included seeds of many varieties of grasses and clovers and other forage plants and a large number of prepared foods—such as meal and bran from various grains, oil meal cake, mixed food, cotton-seed hulls, cotton-seed cake, cotton-seed meal, gluten food, and other concentrated dairy food stuffs known to the public under various trade names. Special cases were prepared for these exhibits and they were entered under the contributors' or makers' names.

Collective exhibit.—As already stated, the collective exhibit was prepared by the Division of Agrostology or was presented by correspondents. In so far as it was possible to do so, this portion of the exhibit was designed to illustrate the special features of the work of grass and forage plant investigations. The grasses on exhibition were displayed on panels 35 inches wide by 6 feet long. Usually two to three varieties were attached to a single panel, the attachment being effected by fine wire drawn around the specimens and through the panel, being fastened at the back. The cases in which the panels were placed were sufficiently deep to allow of an exhibition of small bales of hay at the base of each panel. The hay in these bales was illustrated by the specimens on the panels above. The panel specimens were prepared by pressing them between driers without bending or folding them. This, of course, necessitated the use of large papers for driers and a correspondingly large press, but this manner of preparation of the material was eminently satisfactory, the

display being much better than that which would have resulted from the use of sheaves or round bundles. By the side of each specimen was fastened a glass tube containing a sample of the seed of the variety attached, adding to the value of the exhibit.

Panel No. 1 contained specimens of important varieties, with photographs of original types of timothy, exhibiting the results of original investigations made at the West Virginia Agricultural Experiment Station, by Prof. A. D. Hopkins, vice-director of the station.

Panel No. 2 contained forms of German, Korean, and Japanese foxtail millets, grown in the grass garden of the Division of Agrostology on the grounds of the United States Department of Agriculture.

Panel No. 3 contained specimens of Japanese broom-corn millet, both white and red seeded varieties, Japanese barnyard and Japanese foxtail millets grown at Amherst, Mass., from imported seed.

Panel No. 4 contained side-oats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua oligostachya*), and bunch wheat grass (*Agropyron divergens*), all of which are among the most valuable of the native range grasses of the United States. The specimens were from seed grown at Walla Walla, Wash., by the United States Department of Agriculture through the Division of Agrostology.

Panel No. 5 contained tall reed fescue and the common meadow fescue, introduced grasses, and the buffalo bunch grass (*Festuca scabrella*), a native meadow and pasture grass of the Rocky Mountain region.

On Panel No. 6 were displayed a widely distributed native meadow grass, known in some localities as big blue stem (*Andropogon provincialis*), and Johnson grass (*Andropogon halepensis*). The former was in times past abundant on the cattle ranges of Texas, and in some portions of the prairie regions it still forms an important element of the so-called prairie hay; the latter is a valuable hay grass, but in the cotton growing States of the South it is looked upon as a weed of the worst character.

Panel No. 7 contained a sample of big cord grass (*Spartina cynosuroides*), a native of low, moist meadow lands, and bushy blue stem (*Andropogon nutans*), a native of dry meadows, thickets, and borders, especially abundant in the prairie regions of Illinois and Missouri.

Three of the native wheat grasses were exhibited on Panel No. 8: Meadow wheat grass (*Agropyron pseudorepens*), a native of rich meadow lands of the Rocky Mountain region; slender wheat grass (*Agropyron tenerum*), growing in the same region and exhibiting a capacity for growing in strongly alkaline soils, and western wheat grass, or the blue stem of Montana, one of the most highly prized of the hay grasses of the Northwest.

Three of the introduced meadow and pasture grasses were shown on Panel No. 9. These were Italian rye grass (*Lolium italicum*), tall meadow oat grass (*Arrhenatherum elatius*), and orchard grass (*Dactylis glomerata*), all well-known grasses to the farmers of the Eastern and Southern States.

Texas blue grass (*Poa arachnifera*), Nevada blue grass (*Poa nevadensis*), and Kentucky blue grass (*Poa pratensis*) were all displayed on Panel No. 10. The first, Texas blue grass, is a valuable pasture grass and a native of the southwest United States. Nevada blue grass is a native of the Rocky Mountain region and promises to be of much value in cultivation. Kentucky blue grass is widely known and a grass most frequently used for the establishment of permanent pastures.

Three brome grasses were displayed on Panel No. 11, two of them native meadow grasses of the Rocky Mountain region and one the now well-known smooth brome grass (*Bromus inermis*) imported into this country from Russia.

Panel No. 12 contained three varieties of soy beans—Chinese, Early White, and Medium Green—all grown at Amherst, Mass., and exhibited by the Hatch Experiment Station.

Panel No. 13 contained a specimen of Florida beggarweed, a valuable forage plant for the South. The specimen exhibited was grown in the grass garden of the division, on the Department grounds.

Panel No. 14 contained a specimen of sprangle (*Leptochloa dubia*), a native of the dry uplands of the southwestern United States, exhibited by James K. Metcalfe, of Silver City, N. Mex. This grass has been successfully grown in the grass garden on the Department grounds and promises to be one of the most important of our native species for hay.

Panel No. 15 contained an exhibition of new varieties of timothy (*Phleum pratense*) originated at the Minnesota Experiment Station and exhibited by Prof. William M. Hays.

Panels Nos. 16 and 17 contained six important sand-binding grasses: (1) Indian millet, a native of the semiarid regions of the West, growing sometimes in pure sand, as valuable for forage as for holding the shifting sands; (2) sea oats, a sand-binding grass of the South Atlantic coast; (3) seaside blue grass, a grass native about the sand dunes along the Pacific coast near the mouth of the Columbia River; (4) sand lyme grass, a native of the Pacific coast region; (5) yellow lyme grass; (6) sand-binding wheat grass—all from the same region and all valuable as sand binders.

Panel No. 18 contained one of the southwestern *Panicums*, known locally as alkali saccatone, a very promising hay grass, exhibited by Mr. James K. Metcalfe, of Silver City, N. Mex.

The bales of hay which, as already mentioned, occupied the same case with the panels were supplied by Mr. James K. Metcalfe, Silver City, N. Mex.; Col. H. L. Bentley, Abilene, Tex.; and Mr. A. B. Leckenby, Portland, Oreg.

The number of photographs exhibited was 275. These, as in the case of all the photographs exhibited by the Department, were mounted on sheets 22 by 28 inches, and they illustrated a great variety of subjects connected with grass and forage plant investigations. There was an extended series of photographs illustrating the many varieties of millets. There were represented the various forage crops grown in the grass garden of the Department of Agriculture in Washington, D. C.; at Walla Walla in the State of Washington, and at other points. The number of varieties of economic grasses thus shown was unusually large and interesting. It included not only many foreign species but also a great number of natives, especially those of the western cattle ranges and Rocky Mountain districts. There was another series of photographs illustrating the drifting sands and sand dunes on the Atlantic and Pacific coasts and various other points, and of the grasses used as sand binders, together with the methods of handling these in the work of fixing moving sands.

The miscellaneous items in the collective exhibit consisted of samples of seed, sheaves of grasses and fodder plants, and small bales of hay. Those taking part in this exhibit are enumerated below:

Mr. Nelson, Coleman, Tex.: German millet.

L. A. Burgess, Lonica, Ill.: German millet.

T. W. Wood & Sons, Richmond, Va.: Golden or German millet, Southern or golden millet, pearl millet, tall meadow oat grass, Florida beggar weed, black-eyed cowpea, gray Taylor cowpea, black cowpea, crimson clover, Johnson grass.

Henry Lenz, Leighton, Ala.: German millet.

W. D. Smith, Anthon, Tex.: Big German millet.

W. U. Parke, Worthing, S. Dak.: German millet.

James B. Coines, Omega, Okla.: Little French millet and white Kafir corn.

Melville Potter, Oketo, Kans.: German millet.

H. C. Bradstreet, Clifton, Tex.: Large German millet.

C. F. Doan, Doans, Tex.: Small golden millet and white Kafir corn.

H. C. Warner, Forsetburg, S. Dak.: Common millet, red lump millet, Western wheat grass, big corn grass, blue joint grass, and big blue stem.

George H. Kerr, Newark, Del.: Hungarian millet.

F. Barteldes & Co., Lawrence, Kans.: Pearl millet, white Kafir corn, white Milo maize, yellow Milo maize, Jerusalem corn, brown Durra, Kansas orange sorghum, early amber sorghum, Cavanaugh sorghum, improved evergreen broom corn, Folger sorghum, dwarf broom corn, extra early Japanese broom corn, red Kafir corn and white Kafir corn, and black-chaff white Kafir corn.

J. M. Emanuel, Wray, Colo.: Broom-corn millet and red Kafir corn.

Jacob Lang, Hope, N. Dak.: Broom-corn millet.

Abilene County, Tex.: Japanese millet, dwarf Milo maize, white Kafir corn, and red Kafir corn.

W. F. Stephen, Harrisonville, Mo.: Timothy.

James K. Metcalfe, Silver City, N. Mex.: Sprangle, saccatone, New Mexican crab grass, Curley mesquite, and Metcalf bean.

Emory Vine, Miles City, Mont.: Smooth brome grass.

Charles S. Brent, Paris, Ky.: Kentucky blue grass.

Samuel H. Shouse, Versailles, Ky.: Kentucky blue grass.

W. R. Gluyas, Hoffland, N. Dak.: Smooth brome grass.

J. S. Killen, Minden, La.: Fescue grass.

John A. Manget, Marietta, Ga.: Giant rye, Texas rust-proof grass, red Crowder cowpea, red clover, white clover, crimson clover, Johnson grass, oat hay, barley hay, rye hay, and green meadow hay.

W. H. Hancock, Shullsburg, Wis.: Winter rye.

Department of Agriculture, Division of Agrostology, Washington, D. C.: Tall meadow fescue grass, orchard grass, tussock grass, giant rye grass, silvery salt grass, sheep fescue, white clover, wild rye, Kahn's brome grass, western wheat grass, giant rye grass, Terrell grass, northern red-top grass, and short-awned brome grass.

A. B. Leckenby, Portland, Oreg.: Seaside blue grass and meadow wheat grass.

Levi Exline, Brownsburg, Minn.: Australian saltbush.

The Hatch Experiment Station, Amherst, Mass.: Japanese red broom-corn millet, Japanese white broom-corn millet, Japanese foxtail millet, medium green soy bean, medium black soy bean, and Japanese barnyard millet.

J. M. McNeel, McRae, Ga.: German millet and white Crowder cowpea.

W. H. Heideman, Kalispell, Mont.: Dwarf Essex rape.

A. R. Kilen, Brownsburg, Minn.: Timothy and alfalfa.

Hawley & Moody, Oasis, Utah: Alfalfa.

Wesley Brittain, Parkman, Wyo.: Alfalfa.

William Alldridge, Hinckley, Utah: Alfalfa.

Emile Boehmke, Remsen, Iowa: Red clover.

W. S. Waite, Wartrace, Tenn.: Whippoorwill corn.

Austin S. Taft, Weston, Ohio: Medium or small clover.

F. W. Meyer, Bonney, Tex.: Two samples of big blue stem.

J. M. C. Chaves, Abiquin, N. Mex.: Vallo bean.

T. W. Jackson, Prairie Point, Miss.: Spanish peanuts.

John Koehler, Harrisonville, Mo.: Common red clover.

A. F. Lampton, China Grove, Miss.: Lampton breakfield pea.

Ray, Andrews & Co., Salt Lake City, Utah: Alfalfa.

New Orleans Board of Trade, New Orleans, La.: Rice bean and rice polish.

W. L. Hites, Windom, Kans.: Kafir corn.

F. L. Witten, Trickham, Tex.: Red top sorghum.

C. H. Murphy, Caledonia, Minn.: Blue peter pea.

John W. Barwell, Waukegan, Ill.: Fill-the-basket egg food, Blatchford calf meal, and Barwell's horse and cattle food.

W. O. Bussinger, Lebanon, Kans.: Kansas beauty Kafir corn.

F. L. Moffett, Chillicothe, Tex.: White African sorghum and yellow Milo maize.

- W. A. Craighead & Sons, Breckenridge, Tex.: White Kafir corn.
 E. C. Hill, Anson, Tex.: Durra corn.
 Jesse Gidley, Sand Creek, Nebr.: Dowdy Kafir corn.
 L. M. Shafner, Mulberry, Tenn.: Red ribbon sorghum.
 W. D. Smith, Anthon, Tex.: Early amber sorghum.
 Charles Obra, Sapulpa, Ind. T.: White Kafir corn.
 G. G. Baker, Britton, Okla.: White Kafir corn.
 J. H. Hall, Langdon, Mo.: Branching Durra.
 C. G. Bray, Ursula, Ark.: White Kafir corn.
 Seth H. Kenny & Son, Morristown, Minn.: Minnesota early amber sorghum.
 J. Doans, Doans, Tex.: Sumac sorghum and dwarf Milo maize.
 C. C. Nelson, Plainsburg, Cal.: White Egyptian clover.
 George A. Smith, Gayville, S. Dak.: Timothy.
 E. F. Barnes, Bloomington, Okla.: Black hulled white Kafir corn, early dwarf Milo maize, and white-hulled white Kafir corn.
 David Griffith, Aberdeen, S. Dak.: Canadian wild rye and sprangle top.
 David McCoy, Solomon, Kans.: Black chaff Kafir corn.
 L. H. Bentley, Abilene, Tex.: Side oats grama, annual Australian salt bush, Texas millet, blue grama, hairy vetch, Terrell grass, Canada wild rye, hairy-flowered panic grass, common millet, smooth barnyard grass, German millet, pearl millet, African millet, switch grass, Bentley grass, grapevine mesquite, Sanwa millet, tall panic grass, cotton top, needle grass, galleta, and lowland meadow grass.
 The Glucose Sugar Refining Company, Chicago, Ill.: Fancy corn bran, Chicago gluten meal, and gluten food.
 John E. Ennis, Narcoossee, Fla.: Florida beggar weed.

F. LAMSON-SCRIBNER,
Expert in Charge of Foods of Animals.

THE LEAF-TOBACCO COURT.

In the official classification of the Paris Exposition of 1900, under Group VII, class 41, among "Inedible agricultural products," tobacco, in stalk, in leaf, and in seed, is enumerated, with a footnote stating that these products are included in the class of tobacco manufacture.

In devising the exhibit scheme for the raw products of agriculture in my department, leaf tobacco was considered as coming under the provisions of the law, and the Secretary of Agriculture therefore authorized Milton Whitney, chief of the Soils Division of the United States Department of Agriculture, to collect and prepare this exhibit. In this work he was assisted by Mr. Marcus L. Floyd, who, in May, 1899, was appointed an expert in agriculture in my department, but who was subsequently appointed tobacco expert of the Division of Soils and specially detailed for the work of securing and preparing the exhibit of leaf tobacco to be displayed in Paris. In order to obtain good and representative samples of all the types and grades of tobacco produced in this country, Mr. Floyd visited each important tobacco-growing section and personally arranged with the leading packers and growers for a full line of samples which would represent all the types and grades produced in their respective localities. Thus a collection of nearly 2,000 samples was secured, the exhibit in its entirety form-

ing the most complete and systematic series of leaf tobacco ever shown in any foreign country, if not in our own country.

This exhibit occupied about 650 square feet of space under the entresol gallery at the intersection of the main cross aisle. It filled two large pavilion cases, each covering 3 by 12 feet of floor space, two cases covering 2 by 9 feet, and 67 running feet of alcove-case construction, besides a table case 2 by 9 feet, in which was installed photographs and a small collection illustrating the different uses of tobacco in manufacture.

The collection was received in Paris in perfect condition, owing to the manner in which it was packed, zinc-lined cases with rubber cloths for wrapping the tobacco having been employed. The exhibit was installed by Mr. Floyd as soon as the space was ready for the work and immunity from prevailing dust conditions made it safe to open the boxes. As a precaution against injury, however, the space was first wholly inclosed with heavy burlap, which formed a tight room wherein the work could be pushed without interruption from visitors or others, and with absolute protection from dust or other destructive elements. After the arrangement was completed and the printed labels were placed in position the cases were glazed and the barricades removed.

While this superb collection was installed in my department, the Exposition officials ruled that it must be classed in chemical industries. Group XIV, class 91—tobacco and matches—this group being in Director Capehart's department, and it was considered by the jury of awards as an exhibit pertaining to the latter department. Mr. Floyd was appointed a member of the jury in class 41, but was subsequently assigned to class 91, in which the exhibit would be examined for award.

I append herewith the report of Mr. Floyd, with detailed statements concerning the exhibit:

REPORT OF MARCUS L. FLOYD, EXPERT IN CHARGE OF THE TOBACCO EXHIBIT.

The manufacturing and export types—such as are used for cigarettes, snuff, plug, chewing, and pipe smoking—were fully represented from the States of Virginia, Maryland, North Carolina, Tennessee, Kentucky, and Ohio, there being shown each grade and type and shading in color from the finest bright lemon yellow to the darkest mahogany and from the dark mahogany to the raven-black leaf. These samples were carefully graded as to their commercial use, and also graded and classified according to the requirements of both our domestic and foreign trade, each sample bearing a label which explained its commercial use and to what trade and country it was especially adapted.

The differences in the foreign types are worthy of consideration. These types are not foreign in the sense that they are grown in foreign lands, but are so called because they are cured and manipulated according to the demands of the foreign trade. To the general public such differences are hardly perceptible, but in the trade the slightest difference in shade, color, thickness, shape, and length of leaf is

taken into account in determining to what country or trade it is best adapted. The tobacco sections displayed much concern in this exhibit, and showed much pride in the arrangement of samples. Each foreign country could find in this exhibit leaf suited especially to meet its requirements.

The finer grades (the cigar types) were represented by samples from Connecticut, New York, Pennsylvania, Wisconsin, Ohio, Florida, and Texas, every grade and type of cigar leaf produced in this country being shown. Great care and skill were exercised in the selection and arrangement of these samples. The principal divisions for cigar leaf tobacco are wrappers, binders, and filters, and each of these is divided and classified into many grades. The light wrapper leaves are divided into sixteen sizes ranging from 10 to 26 inches, each inch representing a grade. Like sizes are also made of the medium-colored and dark wrappers. The binders are divided into about four sizes and as to color are graded from light to medium and from medium to dark, while the body of the leaf is also considered in the assorting. Fillers are represented in many lengths and are divided into light, medium, and heavy-bodied leaves. The exhibits of cigar leaf which attracted most attention from the general public, and especially from the jury, were from Ohio and Florida, as will be seen by reference to the list of awards. This leaf-tobacco exhibit comprised only raw material, supplemented by a large collection of photographs and, in a few instances, by samples illustrating the different stages of tobacco in the process of manufacture.

The tobacco jury was composed of sixteen members, fifteen being foreigners representing foreign interests and one American representing the American interests. As each member of the jury was directly interested either in the production or manufacture of tobacco, each was thoroughly acquainted with the article and could quickly see the merits or demerits of the leaf. About thirty countries entered this contest, exhibiting samples of the leaf produced by them. The time occupied by the jury in examining these exhibits was about six weeks. After carefully examining the exhibits at the space where they were displayed, the jury requested that the best samples of each exhibit be sent to a prepared room for jury work, where a more thorough examination of the leaf could be made. These facts are mentioned to show that it was the purpose of the jury to do absolute justice to each exhibit and exhibitor. When the work of examining the various exhibits was completed (during which time each juror made his own notes relative to each exhibit) the voting of awards began, the following scale being used: From 1 to 5 points of merit entitled the exhibitor to honorable mention; 6 to 10 points, bronze medal; 11 to 15 points, silver medal; 16 to 20 points, gold medal; and 21 to 25 points, grand prix. It is gratifying to note that the American collective exhibit of leaf tobacco received 16 votes of 25 points of merit, this being the full limit and giving us the grand prix.

After this began the consideration of the samples of special types contributed by individuals. There were 25 individuals or firms that contributed to the American exhibit, 9 receiving gold medals, 5 receiving silver medals, and the remainder receiving honorable mention. The result was as follows: Department of Agriculture, collective exhibit of all types of American tobacco, 25 points, grand prix; Owl Commercial Company, Quincy, Fla., Sumatra wrappers and Cuban fillers, 20 points, gold medal; Cullman Bros., New York, Zimmer Spanish, Little Dutch, Ohio seed leaf, Wisconsin binders, 19 points, gold medal; E. K. Vietor & Co., Richmond, Va., manufacturing and export tobacco, 19 points, gold medal; M. H. Clark & Bro., Clarksville, Tenn., Tennessee foreign types, 18 points, gold medal; J. S. Cunningham, Cunningham, N. C., bright tobaccos, 18 points, gold medal; Havana Commercial Company, New York, cigar types, 18 points, gold medal; Miller, Du Brul & Peters Manufacturing Company, Cincinnati, Ohio, machines for manufacturing tobacco and cigars, 18 points, gold medal; United States Tobacco Company, Richmond, Va., plug and twist in process of manufacture, 18 points, gold medal; Jacob Stahl Company, 18 points, gold medal; Dibrell Bros., Danville, Va., bright tobaccos, manufacturing

and export tobaccos, 15 points, silver medal; Florida Habana Company, Quincy, Fla., Cuban and Sumatra, 15 points, silver medal; Felix Littman, Quincy, Fla., Cuban and Sumatra, 15 points, silver medal; T. S. Williamson & Co., Danville, Va., bright tobaccos, 14 points, silver medal; the Surbrug Company, 14 points, silver medal; Baltimore Leaf Tobacco Association, Baltimore, Md., Maryland and Ohio types, honorable mention; Joseph Bimberg, Elmira, N. Y., cigar types, honorable mention; Levi Blumenstiel & Co., New York, Porto Rican leaf, honorable mention; Cincinnati Leaf Tobacco Warehouse Company, Burley, honorable mention; Hagan-Dart Tobacco Company, Richmond, Va., manufacturing and export, honorable mention; Hoge, Irwin & Co., Kingston, N. C., bright tobaccos, honorable mention; J. F. Jordan, Greensboro, N. C., bright tobaccos, honorable mention; Louisville Leaf Tobacco Company, Louisville Ky., Burley, honorable mention; Spiller & Robinson, Ada, Tex., Vuelta Abajo, honorable mention; L. L. Strauss, Richmond, Va., bright tobacco, honorable mention; Sutter Brothers, New York, N. Y., cigar types, honorable mention; Texas Leaf Tobacco Growers' Association, Houston, Tex., Cuban types, honorable mention; W. Wilkins, Winston, N. C., honorable mention; Clay & Cock Company, New York, Havana cigars, honorable mention.

In many other cases the jury would have awarded gold medals, notably in those of the Baltimore Leaf Tobacco Association, the Louisville Leaf Tobacco Exchange, the Cincinnati Tobacco Warehouse Company, and Sutter Brothers, all of the exhibits of which were fine and greatly appreciated by the jury; but as these exhibitors did not claim in their application for representation to be producers of the leaf, no special awards could be given.

The first exhibit to be considered was that of the Owl Commercial Company, comparison of the Florida Sumatra leaf being made with the leaf grown on the island of Sumatra. In considering these goods much had to be overcome in the way of preconceived ideas as to the merits of the leaf grown in Sumatra. Although this tobacco has stood for years without a rival for cigar wrappers, yet the leaf produced in Florida from Sumatra seed was there to claim superiority, which claim was finally sustained by the jury. Upon investigation it was found that in appearance and style the Florida-grown leaf was equal to the Sumatra-grown leaf, while the fact that it required 25 more leaves of a given size to weigh 1 pound of the Florida-grown leaf than of the Sumatra leaf showed the greater wrapping capacity of the former. It was also found that the Florida-grown leaf was the more elastic. Thus 16 votes of 20 points of merit were cast in favor of the Florida leaf, while the Sumatra-grown leaf was voted 18 points of merit. The Florida-grown leaf from Cuban seed also received favorable consideration, being voted 18 points of merit against 18 points received by the Cuban product. Cuba's exhibit of leaf tobacco consisted of the filler grade only, while Florida displayed leaf produced from Cuban seed that was desirable for wrappers. Although it was decided by the jury that the Cuban-grown leaf was superior to that grown in Florida, the wrapper leaf displayed by Florida so added to the value of the latter's exhibit that both were given the same degree of merit.

The next exhibit that attracted special attention was that made by Cullman Brothers of Zimmer Spanish, little Dutch, seed leaf grown in Ohio and seed leaf grown in Wisconsin. This display, which represented only fillers and binders, was excellently arranged and showed the leaf of each type in all its grades. It also showed the raw leaf and the leaf ready for manufacture. This collection may well be classed as the most unique and comprehensive showing made at the Exposition, and, while these types have no special foreign competition, they stand out as tobaccos of excellent quality, and were voted by the jury 19 points of merit collectively. The exhibit of Connecticut broad leaf and Habana seed leaf was in every way a creditable one, receiving great admiration from the jury, which would gladly have given official recognition of the merits of this tobacco as a cigar wrapper had the display been made by growers instead of by dealers.

The manufacturing and export types were next considered. These types include cigarette, pipe-smoking, fine-cut chewing, plug, and snuff tobacco. Of course our dark tobaccos grown in Virginia, Tennessee, and Kentucky are without competition, a fact which is also true of the White Burley grown in Kentucky and Ohio and the old-line smoking leaf of Maryland and Ohio. These showings being exceedingly fine, received from the jury a gold medal. The bright-yellow leaf produced in North Carolina, Virginia, South Carolina, and eastern Tennessee, which is to-day a strong rival of Turkish tobacco in the manufacture of cigarettes, was considered by the jury in connection with the leaf produced in Turkey. It was seen that while American bright-yellow tobacco is quite similar in flavor and aroma to the Turkish leaf, it is really superior, because the greater size of the American leaf makes it useful in some ways which are not open to the Turkish leaf. Thus, in the manufacture of all-tobacco cigarettes the American leaf furnishes not only fillers but the wrappers, which the Turkish leaf is too small to supply. The former also supplies plug wrappers and fillers, besides yielding from 800 to 2,000 pounds per acre against 200 pounds of Turkish. The American product may be sold profitably at from 20 to 25 cents per pound, whereas the Turkish leaf can not be produced for less than 50 cents per pound. These points were quickly recognized by the jury, which gave a vote of 18 points of merit to the American bright leaf against 18 points to the real Turkish product.

The verdict rendered upon our leaf by a competent and impartial jury encourages the belief that with intelligent farming and proper manipulation the producers of the United States will soon drive from our markets those types of foreign tobaccos that have been so largely imported into our country in recent years. It also emphasizes the fact that we will outreach foreign producers in the fight for trade with other countries. Although Sumatra, Cuba, and Turkey are our strongest competitors, we have the satisfaction of knowing that the tobaccos produced in each of these countries, which have become famous the world over, have met with close competition in the American leaf. American skill and energy will undoubtedly soon lead in the production of all grades of the leaf that has made this country rich.

MARCUS L. FLOYD, *Expert*.

THE FIBER COURT.

The fiber exhibits occupied a space of almost 1,200 square feet on the eastern end of the entresol gallery. They were largely collective, and were for the most part confined to cotton and wool, although there were several exhibits of other fibers, besides five binding-twine exhibits. The latter, however, were classified in the textile group because they were in part manufactured products.

The wool exhibit, which was collected and prepared by Hon. J. R. Dodge, a recognized authority on sheep husbandry in the United States, was in two parts: First, an exhibit of carefully prepared specimens received from the growers; and, secondly, a commercial exhibit of fleeces contributed by dealers of Philadelphia, New York, and Boston, supplemented by a very choice selection of 24 fleeces loaned by the Philadelphia Commercial Museum.

The farmers' exhibit of about 100 samples represented all sections of the country from the Atlantic to the Pacific, many of the specimens having been taken from prize-winning animals. The commercial exhibit, which comprised about twice this number of fleeces, was selected especially to supplement the farmers' collection, which,

owing to the earliness of the shearing season and to the fact that the wool clip of 1899 had been sold by the farmers in many sections before the work of collection for Paris was begun, did not show fully the different breeds of animals or grades of fiber represented in our national industry.

The wools were displayed in deep panel boxes measuring 3 by 5 feet, under plate glass, there being 12 fleeces to each section. These sections or panels were then arranged in handsome cases, made up of a base 2 feet high, and surmounted by a deep cornice, and were separated from one another by 2-inch pilasters, ornamented with a simple design in gold. The entire series was labeled with printed cards, in French and English, giving the name of the breed, the grade, and, in the farmers' collection, the address of the grower, with other interesting data. See also jury report on wools, class 41.

In the report by Mr. Dodge, which follows, will be found detailed statements of economic considerations relating to the sheep husbandry of the United States, based upon the series of wools exhibited.

REPORT OF HON. J. R. DODGE.

These wool exhibits included samples of nearly all breeds and grades of our domestic wools from the farming States and from the ranches of the Rocky Mountain area. They included the English mutton breeds and all of the Merino breeds derived from the original Spanish fine wool sheep, with many subbreeds distinctively the product of American sheep raising, designed to give variety and exemplify peculiar characteristics meeting the wants of manufacturers, and at the same time to indicate heavier carcasses and greater aptitude for fattening to meet the increasing demand for mutton.

The design was to show the qualities and characteristics of wools of pure-bred sheep of all the different strains, as produced in the United States, as well as those of wools of mixed breeds, representing the commercial grades with which buyers are familiar; thus making a collection of American wools fairly representative of the body of the wool supply of our great markets, and showing fairly its varied qualities and specific practical values.

American wools as shown in this collection included the long and middle wools; the combing and coarse clothing fibers for which Great Britain has so long been famous, the fine Saxony Merino fleeces which in German husbandry attained the highest reputation for fineness of all the Merino breeds, the French Merino type—the Rambouillet—noted as the heaviest in body and fleece with the longest fiber, and the American Merino, renowned for weight of fleece and density and strength of fiber; samples of the highest skill in breeding in Great Britain, Germany, France, and America, as well as modifications of the American Merino in numerous subbreeds produced to obtain length of fiber in combing wools combined with strength and elasticity. This showing in the breeding of the fine-wooled sheep has not been surpassed by any foreign country. All that is best in the blood of the breeds of the world, producing combing or clothing wool, is found in the flocks of America. The countries producing the largest supplies of desirable wool have evolved their flocks in part by drafting from our American Merino breeding studs for the last thirty years. Our wools, therefore, in variety and quality represent approximately, if not fully, the cloth wools of the world. This fact is understood and generally acknowledged. Mr. North, the secretary of the American Wool Growers' Association, while



F-13. VIEW OF CEREAL-FOOD COURT, LOOKING NORTHWEST THROUGH ARCH OF FAÇADE, DEPARTMENT OF AGRICULTURE.

seeking in behalf of those he represents for the greatest possible variety in fancy foreign qualities, admits that domestic wools "are as strong and durable as any wools in the world." Thus having practically all the desirable breeds possessed by other wool-growing countries and required by the world's cloth manufacturers, we have all the variety the world can supply, except such variations in quality and characteristics as result from climatic influences. European factories depend upon the product of Australia, Cape Colony, and Argentina to supplement the inefficient and often meager domestic supplies of their own, while we breed for ourselves and the world, especially for the countries named, the sheep that are the basis of this supplementary supply.

The main dependence of foreign factories is on Australia, of which certain districts with sufficient rainfall and moderate temperature produce every desirable quality for soft and lustrous tissues, but large areas of that southern continent are arid and subject to extreme droughts, producing trash and harsh fibers. Even the wool of the most favored districts is not equal in strength to that of the American Merino grown in this country. The wools of Argentina are similar to those of this country, but on the whole are not equal to the latter in intrinsic value. Much of the preference in manufacturing circles for Australian wools is due to the fact that the fleeces are skirted, or practically sorted, the less valuable sorts being eliminated, while the remainder, which are of higher value by fully one-third, are exported as ordinary average fleeces, this scheme having the effect of partially reducing the tariff or protective benefit to home growers from 11 and 12 cents to not much more than 8 cents per pound.

Twenty years ago the Merino blood predominated in our flocks to such a degree that not more than one-fifth or one-sixth could be claimed as pure bred or grades of the English mutton type. The increasing demand for mutton and for cross-bred combing wool has diminished this Merino predominance here as well as in the other wool-growing countries, until the two races are nearly equally divided in numbers, though in the grades of the mutton brand the wool is much improved in fineness by even a small mixture of Merino blood. As they separate into two great classes, according to the predominant blood of each, there is less blood of the mutton type in the Merino type than of the Merino blood in the mutton class, so that really the Merino characteristics still predominate in American flocks.

While the breeding flocks of the American Merino are of the highest character, still remarkable for density and weight of fleece, generally free from wrinkles and other accentuation, it must be admitted that a large proportion of the skilled breeders are devoting their attention to the several Delaine subbreeds of the large fiber combing-wool type, which were represented in this collection by samples of wool from some of the best flocks—the Standard Delaines, the National Delaines, National Dickinson Delaines, and Black-Top Delaines, the heaviest fleeces weighing 16 to 18 pounds. These flocks are numerous and popular in Pennsylvania, West Virginia, Ohio, and Michigan, and are found in the more western farming States, also in Texas and elsewhere. Fine Saxony fleeces from the home of this class in western Pennsylvania were represented in this collection, including fine samples from the flocks of the veteran Saxony breeder, John G. Clarke, of Washington, Pa. Pennsylvania American Rambouillets, which have been growing in popularity for several years, are becoming numerous in New York, Ohio, and Michigan, and are found in other States. Sample fleeces of some of their best flocks were shown.

The English breeds comprise a large proportion of the sheep east of the Missouri, the Merinos of that region being mostly pure-bred representatives of the various breeding flocks, commanding good prices for the improvement of the sheep of the country, especially those of the pastoral and range districts.

The English breeds were all numerously represented. Of the Downs family perhaps the Shropshires are the most numerous and popular. The Oxfords and Hamp-

shires are held in high esteem, and the original Southdowns are widely distributed. The Dorset Horns, though of more recent introduction, have a wide distribution, and are found by thousands in the central States, especially between the lakes and the Ohio River. The Lincolns, so much in demand in Australia and Argentina, are also very popular in our range districts and are used extensively for crossbreeding and the production of lustrous wool. The Cotswold are the preference of many and are widely distributed. The Cheviots are among the latest introductions of English breeds and were represented in the wools of this collection.

With all the variety of American wools, with numbers of sheep so much greater than those of any other manufacturing country, and with the same wool markets enjoyed by Great Britain, France, and Germany for supplementing domestic needs, no country in the world has a better or more varied supply of material for cloth manufacture. While American flocks are increasing, those of the other manufacturing countries are diminishing, reducing the domestic production. Great Britain has no Merino flocks, while this country has about all the Merino breeds and subbreeds known, and in addition about all the English breeds. In variety, and especially in volume, our domestic supply is greatly superior to that of England and France. For whatever foreign wools that may be required or desired our manufacturers have access to the London auctions and other markets where foreign manufacturers are obliged to obtain by far the largest portion of the stock they require. Our manufacturers are therefore more favorably situated for an adequate and varied wool supply than any others in the world.

From 1861 to 1894 our manufacturers, including carpetmakers, obtained about three-fourths of their wool from domestic sources, and though the increase in per capita consumption was doubled during that period and population more than doubled, the proportion of foreign wool manufactured was greatly decreased. Not only that, but the proportion of foreign wools in imports of woollen goods was also decreased. There is no natural difficulty in producing in America all the woollen goods required to supply the wants of the present and immediate future. There are people who will always buy foreign goods because they are foreign and the whims of fashion will always require a limited proportion of foreign weaves.

J. R. DODGE.

Hecht, Liebmann & Co., Boston, Mass.: Twenty-four fleeces from Merinos grown in Utah, Idaho, Montana, Nevada, Wyoming, California, Texas, Maine, Massachusetts, and Idaho. Nos. 1 to 24.

Hallowell, Donald & Co., Boston, Mass.: Twelve fleeces from Montana, Wyoming, Oregon, Idaho, Texas, Arizona, Ohio, and Michigan. Nos. 25 to 36.

Luce, Manning & Co., Boston, Mass.: Twenty-four fleeces from sheep grown in Utah, Colorado, Montana, Oregon, and Nevada. Nos. 37 to 60.

Louis S. Fiske & Co., Philadelphia, Pa.: Twelve fleeces from New York, Ohio, Wyoming, and Montana. Nos. 61 to 72.

Philip Jagode & Co., Philadelphia, Pa.: Twelve fleeces, chiefly Merino and Shropshire, from Ohio and New Mexico. Nos. 73 to 84.

Philadelphia Commercial Museums, Dr. W. P. Wilson, director, Philadelphia, Pa.: Twenty-four choice samples, chiefly Merino and Shropshire, from New York, Pennsylvania, Ohio, Wisconsin, Colorado, New Mexico, Texas, and Virginia. Nos. 85 to 108.

Justice Bateman & Co., Philadelphia, Pa.: Twenty-four fleeces,

Merino, Shropshire, and Lincoln, from Ohio, Indiana, Michigan, Montana, Wyoming, Nevada, California, and Texas. Nos. 109 to 132.

Samuel Lee & Co., Philadelphia, Pa.: Twelve fleeces, Saxony Merino, all from Ohio. Nos. 133 to 144.

Coates Brothers, Philadelphia, Pa.: Twelve washed fleeces, fine delaine wools; States not specified. Nos. 145 to 156.

Mauger & Avery, Boston, Mass., assisted by Woolstein & Moore, of New York: Twelve fleeces of breeds and grades of wool, mostly from Atlantic States. Nos. 157 to 168.

William R. Payne & Co., New York City: A very choice collection of Angora goat fleeces, eighteen in number, from Oregon, Utah, California, Texas, Washington, Iowa, and Illinois. Nos. 253 to 270.

In the farmers' or growers' collection no full fleeces were shown, although the samples were very carefully selected from different parts of the fleece, as shoulder, back, and belly, in order to make a comparative showing with the full fleece exhibits. The growers who contributed to this series were as follows:

Koshland & Co., San Francisco, Cal.: Various samples California wool.

J. Lyons, Eureka, Cal.: Two samples Merino.

L. C. Tuttle, Eureka, Cal.: Two samples Merino.

M. S. Koshland, San Francisco, Cal.: One sample Merino.

G. Hooker, Eureka, Cal.: One sample Merino.

S. Wilcox, Red Bluff, Cal.: One sample Merino.

William Clarke, Cahto, Cal.: One sample Merino crossed with Shropshire.

D. S. Cone, Red Bluff, Cal.: One sample Merino.

Haile & Walt, Chico, Cal.: One sample Merino.

Bell & Moore, Red Bluff, Cal.: One sample Merino.

Santa Cruz Island Company, San Francisco, Cal.: One sample Merino.

W. G. Hughes, Hastings, Tex.: Two samples Spanish Merino.

W. S. Beck, Coleman, Tex.: Two samples Delaine Merino.

Scott Holts, Tiffin, Ohio: One sample Dickinson Delaine Merino.

A. R. Clark, Chatham, Ohio: One sample Dickinson Delaine Merino.

H. M. Culbertson, Sonora, Ohio: One sample Delaine Merino.

Max Chapman, Marysville, Ohio: One sample Delaine Merino.

C. W. Baker, Hopedale, Ohio: Two samples Blacktop Delaine Merino.

T. J. Robertson, Hopedale, Ohio: Three samples Delaine Merino.

C. S. Chapman, Marysville, Ohio: One sample Delaine Merino.

John W. Carpenter, Batesville, Ohio: One sample Delaine Merino.

C. C. Shaw & Son, Newark, Ohio: One sample Southdown.

John B. Peele, Bloomington, Ohio: One sample Dorset Horn.

Philip A. Riegel, Arlington, Ohio: One sample American Rambouillet.

F. M. Davisson, West Manchester, Ohio: One sample Oxford Down.
 Joseph E. Wing, Mechanicsburg, Ohio: One sample Dorset Horn.
 C. L. Halladay, Sebawa, Mich.: One sample American Rambouillet.
 Joseph Tompkins & Son, Fostoria, Mich.: One sample Lincoln.
 W. E. Spicer, Bushnell, Ill.: One sample Southdown.
 James A. Stone & Son, Bradfordtown, Ill.: One sample Oxford Down.

R. J. Stone, Stonington, Ill.: One sample Oxford Down.
 Jacob Ziegler, Clinton, Ill.: One sample Shropshire.
 Rutherford Stuyvesant, Allamuchy, N. J.: One sample Dorset Horn.
 Billings Farm, Woodstock, Vt.: One sample Southdown.
 Davis Cossitt, Onondago, N. Y.: One sample American Merino.
 J. D. Van Valkenburgh, Greene, N. Y.: One sample Rambouillet.
 J. D. Van Valkenburgh, Greene, N. Y.: One sample Dorset Horn.
 Joseph Hargrave, Madrid, N. Y.: One sample Dorset Horn.
 J. M. Miller, Upland Grant, Ind.: One sample Merino.
 Charles S. Plumb, Lafayette, Ind.: One sample Cheviot.
 J. W. Robe, Greencastle, Ind.: One sample Lincoln cross.
 William M. Dimler, Fillmore, Ind.: One sample of Leicester cross.
 Daniel Leonard, Leonard, Iowa: One sample Shropshire.
 L. M. Harbley, Salem, Iowa: One sample Shropshire.
 Bales & White, Warsaw, Iowa: One sample Delaine Merino.
 Dewey-Gould Company, Boston, Mass.: Four samples Merino.
 John G. Clarke, Washington, Pa.: Two samples Improved Saxony.
 J. B. Johnson & Sons, Canonsburg, Pa.: One sample Merino.
 James S. McNairy, Canonsburg, Pa.: One sample Merino.
 Lee R. Scott, Burgettstown, Pa.: Two samples Merino.
 M. M. Keener, Plaingrove, Pa.: One sample Blacktop Merino.
 A. S. Eagleson, Washington, Pa.: One sample Dorset Horn.
 W. W. Bell, Manley, Minn.: Four samples North Star.
 Oregon Agricultural College, Corvallis, Oreg.: One sample Shropshire; one sample Cotswold.

Richard Scott, Milwaukee, Oreg.: One sample Cotswold.
 O. C. Roby, Rochefort, Mo.: One sample Merino.
 Luce & Manning, Boston, Mass.: One sample fleece from Utah.
 A. R. Jacob, Clinton, W. Va.: One sample improved Saxony.
 J. C. Hall, Ordway, S. Dak.: One sample Shropshire.
 Tarleton H. Bean, Washington, D. C.: One sample of Alaska fleece.
 W. G. Hughes & Co., Hastings, Tex.: Three samples Angora goat fleece.

John S. Harris, Oakley, Idaho: One sample Angora goat fleece.
 George S. Houck, Eugene, Oreg.: One sample Angora goat fleece.
 Department of Agriculture, Washington, D. C.: One sample Angora goat fleece.

The series of cottons, which was far more extensive than the wool

exhibit, was in the main collected by Mr. John Hyde, statistician of the United States Department of Agriculture. This exhibit was also in two parts: First, a Government collective series of about 450 samples, illustrating leading American varieties in cultivation, contributed by the farmers, and representing a geographical range of twelve States; secondly, one hundred duplicates of these farmers' cottons, which had been stapled and classified by the New Orleans Cotton Exchange for the United States Commission, constituted a distinct series of commercial samples. Accompanying these was a small collection, drawn from the economic museum of the United States Department of Agriculture, showing the principal foreign cottons which enter into competition with the cottons of the United States, and furnish a portion of the world's supply. The exhibit was most complete, covering the entire geographical range of cotton culture, and including all important or well-known varieties, as well as a representative series of grades. The foreign cottons illustrated the leading forms produced in South America, Egypt, Asia, etc.

List of contributors to collective exhibit of cotton samples.

Number of exhibit.	Variety.	Exhibitor.
1, 3.....	Meyers cotton	Wm. Appelt's Sons, Hallettsville, Tex.
4.....	do	B. F. Arnim, Hallettsville, Tex.
5.....	Goose-egg or big-boll cotton.....	R. H. Allen, Midlothian, Tex.
6.....	Bedell cotton.....	E. I. Bedell, Mound, Tex.
7.....	Bryant cotton	J. B. Booth, Paris, Tex.
8.....	Mammoth seed storm-proof cotton.....	J. T. Alexander, Britton, Tex.
9.....	Bendell best cotton	Blanchard & Folsom, Mound, Tex.
10.....	Moon improved cotton	H. T. Braden, Paris, Tex.
11.....	Cook's improved cotton	C. C. Braden, Paris, Tex.
12.....	Storm-proof cotton	T. W. Bryant, Midlothian, Tex.
13.....	Ounce-boll cotton	T. F. Casey, Oglesby, Tex.
14.....	Upland cotton, variety unnamed	Baker Chapman, Riovista, Tex.
15.....	Chilton blue-seed improved cotton	J. B. Chilton, Comanche, Tex.
16.....	King cotton	R. T. Chinn, Coulterville, Tex.
17.....	Miles cotton	Do.
18.....	Harvill cotton.....	L. L. Collins, Carbon, Tex.
19.....	Common Texas upland cotton	Do.
20.....	Improved-mixture cotton.....	J. G. Conn, Neal, Tex.
21.....	Storm-proof cotton	J. W. Currie, Riovista, Tex.
22.....	do	Alonzo H. Draughn, Ryan, Tex.
23.....	Woolup cotton.....	J. W. Easley, Pendletonville, Tex.
24, 26.....	Five-lock cotton.....	J. H. Finks, Waco, Tex.
25.....	"Bohemian" five-lock cotton.....	Do.
27.....	Wm. H. O'Brien's big-roll cotton	M. J. Fuqua, Anderson, Tex.
28.....	Bundy cotton	B. W. Garland, Dekalb, Tex.
29.....	Meyers cotton	H. H. Greene, Hallettsville, Tex.
30.....	do	John N. Guy, Carbon, Tex.
31.....	Peterkin cotton	John Harrison, Nash, Tex.
32.....	Storm-proof cotton	Do.
33.....	Choice Georgia sea-island	W. W. Gordon & Co., Savannah, Ga.
34.....	"Bohemian" cotton.....	R. MacDonald, Trinity, Tex.
35.....	Meyers cotton	E. H. Mitchell, Hallettsville, Tex.
36.....	Big-roll or goose-egg, known locally as "Maasey" cotton.....	R. K. Milton, Midlothian, Tex.
37.....	Big-boll cotton	S. L. Makeig, Ross, Tex.
38.....	Bedell cotton	F. M. Martin, Pecangrove, Tex.
39.....	Bryant cotton	W. E. Moore, Paris, Tex.
40.....	Storm-proof cotton	F. M. Nix, Hico, Tex.
41.....	Peterkin cotton	John L. Oliver, Lancaster, Tex.
42.....	Storm-proof cotton	Do.
43.....	Green-seed cotton	Do.
44.....	Storm-proof cotton	J. W. Orr, Riovista, Tex.
45.....	Jackson limbless cotton	T. W. Oliphint, Huntsville, Tex.
46.....	Large boll white-seed storm-proof cotton.....	I. C. Peterson, Chase, Tex.

List of contributors to collective exhibit of cotton samples—Continued.

Number of exhibit.	Variety.	Exhibitor.
47.....	Pitts's pride cotton	H. B. Pitts & Son, Marshall, Tex.
48.....	Peterkin cotton	Do.
49.....	King cotton	Do.
50.....	Meyers cotton	Rosenberg Bros., Hallettsville, Tex.
51.....	Storm-proof cotton	L. Sanders, Alba, Tex.
52.....	Belle five-lock cotton	John W. Shine, Pendletonville, Tex.
53.....	Big-boll or five-lock cotton	Wm. Stein, New Berlin, Tex.
54.....	Five-lock storm-proof cotton	John H. Sparkman, Era, Tex.
55.....	Schubach cotton	J. C. Speckles, Warrenton, Tex.
56.....	Big-boll or storm-proof cotton	J. E. Smith, Farr, Tex.
57.....	Pelican cotton	Wm. Stein, New Berlin, Tex.
58.....	Meyers seed cotton	John Stagner, Comanche, Tex.
59.....	Woolup cotton	B. L. L. Taylor, Blevins, Tex.
60.....	Harwell cotton	Do.
61.....	Meyers cotton	S. G. Tarkington, Hallettsville, Tex.
62.....	Storm-proof cotton	Sam Walls, Ocee, Tex.
63.....	Common upland cotton	W. S. Walker, Jefferson, Tex.
64.....	Big-boll cotton	R. D. Weaver, Ross, Tex.
65.....	Dan Wilson five-lock storm-proof cotton.	D. J. Wilson, Lois, Tex.
66, 67, 68..	Storm-proof cotton	C. C. Wilson, Boyce, Tex.
69.....	Peerless cotton	J. E. Sullivan, Pilotpoint, Tex.
70, 71.....	Sea-island cotton grown on river lands in the interior of Arkansas.	W. A. Arthur & Co., Texarkana, Ark.
72.....	Common upland cotton grown on black land.	Do.
73.....	Common upland cotton	Do.
74.....	Upland cotton grown on black land ..	Do.
75.....	Black land benders	Do.
76.....	Upland cotton	Do.
77.....	Upland cotton grown on river bottom land.	Do.
78, 79.....	River benders	Do.
80.....	Sea-island cotton grown on black land near Texarkana.	Do.
81, 82.....	Sea-island cotton grown on river land in Arkansas.	Do.
83.....	Cook cotton	H. C. Hallett, Morrillton, Ark.
84.....	Big-boll cotton	Wesley Green, Baxter, Ark.
85.....	Black rattler, truitt, and silk-ozier cotton.	John M. Gracie, New Gascony, Ark.
86.....	Peterkin cotton	Lee Huett, Baxter, Ark.
87.....	do	Berry Hall, Baxter, Ark.
88.....	Upland cotton grown on river land ..	Kosminsky & McFaddin Texarkana, Ark.
89.....	Upland cotton	Do.
90.....	River benders	Do.
91, 92.....	Upland cotton grown on river land ..	Do.
93.....	Big-boll cotton	M. F. Caperton, Adona, Ark.
94.....	Peterkin cotton	Frederick Orenbek, Baxter, Ark.
95.....	do	Washington Richardson, Baxter, Ark.
96.....	Common upland cotton	J. M. King, Hattievill, Ark.
97.....	Cook's long-staple cotton	D. B. Russell, Morrillton, Ark.
98.....	A mixture of Allen's long-staple and common upland cotton.	Do.
99.....	Common upland cotton	Do.
100.....	Cook's long-staple cotton	Do.
101.....	Five-lock cotton	Do.
102.....	Moon cotton	Do.
103.....	Ozier-silk cotton	Do.
104.....	Common river cotton	J. R. Stallings, Morrillton, Ark.
105.....	Moon cotton	J. A. Williams, Columbus, Ark.
106.....	Ocean or Sam Williamson cotton	Do.
107, 109.....	Delinted cotton seed	Advance Gin and Mill Co., Vicksburg, Miss.
108.....	Upland cotton seed, delinted	Do.
110.....	Seed from Allen's hybrid cotton	Do.
111.....	Peterkin cotton	Do.
112.....	Allen's hybrid cotton	Do.
113.....	Bender cotton	Do.
114.....	Delint	Do.
115.....	Linters made from seed of long-staple benders and short cottons after being ginned.	Do.
116.....	Upland cotton	Do.
117.....	do	M. F. Byrd, Roxie, Miss.
118.....	Girard cotton	Sam Baker, Woodson, Miss.
119.....	Upland long-staple cotton	L. Bendat, McComb, Miss.
120.....	Cook's black seed cotton	W. A. Cook, Utica, Miss.
121.....	Cook's upland long-staple cotton	Do.
122.....	Dougherty long-staple cotton	W. E. Collins, Mayersville, Miss.
123.....	Peterkin cotton	Do.
124.....	China prolific cotton	Do.
125.....	Rodgers cotton	R. C. Chandler, Stokes, Miss.

List of contributors to collective exhibit of cotton samples—Continued.

Number of exhibit.	Variety.	Exhibitor.
126.....	Cook's prolific long-staple cotton.....	W. A. Cook, Utica, Miss.
127.....	Upland high-grade cotton.....	S. Cohn & Son, Magnolia, Miss.
128.....	"Extra-staple" cotton.....	Gwin, Davis & Gwin, Brunswick, Miss.
129.....	Ferguson's prolific staple cotton.....	James G. Ferguson, Vicksburg, Miss.
130.....	Griffin cotton.....	John Griffin, Greenville, Miss.
131.....	Timberlake cotton.....	J. O. Gallop, Woodson, Miss.
132.....	Pelican cotton.....	A. T. Graham, Canton, Miss.
133.....	China prolific cotton.....	W. S. Hankinson, Yokena, Miss.
134.....	Allen's hybrid cotton.....	Do.
135.....	Superior benders.....	E. H. Jackson, Arnot, Miss.
136.....	Bonanza cotton.....	Hercules Jones, Canton, Miss.
137.....	Superior benders.....	H. L. Mayer, Magnavista, Miss.
138.....	Hawkins cotton.....	Aaron Moore, Canton, Miss.
139.....	Golody's long-staple cotton.....	J. W. McCord, Sabougla, Miss.
140.....	Russell's big-boll cotton.....	Do.
141.....	Ferguson cotton.....	Patsy McIntyre, Glass, Miss.
142.....	Ozier-Russell big-boll cotton.....	J. S. Moore, Mississippi Experiment Station, Agricultural College, Miss.
143.....	King's improved cotton.....	Do.
144.....	Station hybrid cotton, Drake's cluster and affil.	Do.
145.....	Allen's new hybrid cotton.....	Do.
146.....	China prolific cotton.....	Joseph D. Mitchell, Newtown Landing, Miss.
147.....	Allen's improved cotton.....	James Pearl, Port Gibson, Miss.
148.....	W. A. Pollock's fancy cotton.....	W. A. Pollock, Baird, Miss.
149.....	Griffin cotton.....	Do.
150.....	Superior benders.....	Realty Company, Smedes, Miss.
151.....	Cook cotton.....	Charles Scott, Rosedale, Miss.
152.....	Common upland cotton.....	H. C. Ferrell, Quincy, Miss.
153.....	Thompson's improved cotton.....	Z. T. Thompson, Strongs Station, Miss.
154.....	King's improved cotton.....	J. M. Williams, Woodson, Miss.
155.....	Williams's best cotton.....	W. B. Williams, Strongs, Miss.
156.....	Benders seed cotton.....	C. T. Worthington, Leota Landing, Miss.
157.....	Early okra cotton.....	J. Y. Barbee, Ripley, Tenn.
158.....	Cluster Peterkin cotton.....	W. A. Collins, Bastrop, La.
159.....	Willis cotton.....	Edward W. Constant, Atherton, La.
160.....	Logan cotton.....	Foster & Glassell, Shreveport, La.
161.....	Kil cotton.....	Do.
162.....	Dil cotton.....	Do.
163.....	Sentell cotton.....	Do.
164.....	China cotton.....	J. W. and A. S. Frankenbush, New Orleans, La.
165.....	Upland cotton, grown in Issaquena County, Miss.	J. M. Frankenbush, New Orleans, La.
166.....	Upland cotton, grown in Hinds County, Miss.	S. Gumbel & Co., New Orleans, La.
167.....	Benders, grown in Pointe Coupee Parish, La.	Do.
168.....	Louisiana upland cotton.....	Do.
169.....	River-bottom cotton, grown in Iberville Parish, La.	Do.
170.....	King cotton.....	Judge E. M. Graham, Ruston, La.
171.....	Upland cotton.....	August Guesnard, Lobdell, La.
172.....	Perkins cotton.....	X. D. Hays, Kents Store, La.
173.....	Peerless cotton.....	Henry Hawkins, Shreveport, La.
174.....	Moon cotton.....	Do.
175.....	Prolific cotton.....	Do.
176.....	Peterkin cotton.....	Do.
177.....	Upland cotton, grown on the banks of the Mississippi River.	Wm. T. Hardie & Co., New Orleans, La.
178.....	Benders, grown on the banks of the Yazoo River, Mississippi.	Do.
179.....	Upland cotton, grown in Mississippi....	Do.
180.....	Cotton grown on the banks of the Mississippi River, in Arkansas.	Do.
181.....	Louisiana long-staple cotton, grown on river bottom.	R. H. Lea, New Orleans, La.
182.....	Louisiana long-staple benders.....	Do.
183.....	Louisiana short-staple upland cotton.....	Do.
184.....	Upland cotton grown in Travis County, Tex.	C. H. Minge & Co., New Orleans, La.
185.....	Heavy benders.....	B. R. Noland, Smithland, La.
186.....	Long-staple upland cotton.....	J. L. Newcomber, Lamar, La.
187.....	Louisiana upland cotton.....	R. H. Lea, New Orleans, La.
188.....	Upland cotton, grown in Franklin Parish, La.	Jno. M. Parker & Co., New Orleans, La.
189.....	Upland cotton, grown in Tensas Parish, La.	Do.
190.....	Benders, grown in Warren County, Miss.	Do.
191.....	Upland cotton, grown in Issaquena County, Miss.	Do.
192.....	Upland cotton, grown on Palmyra Island, Miss.	Do.

List of contributors to collective exhibit of cotton samples—Continued.

Number of exhibit.	Variety.	Exhibitor.
193.....	Upland cotton, grown in Chicot, County, Ark.	Jno. M. Parker & Co., New Orleans, La.
194.....	Upland cotton, grown in East Carroll Parish, La.	Do.
195.....	Upland cotton, grown in Richland Parish, La.	Do.
196.....	Upland cotton, grown in Bolivar County, Miss.	Do.
197.....	Upland cotton, grown in East Carroll Parish, La.	Do.
198.....	Upland cotton grown in Tensas Parish, La.	Do.
199.....	Upland cotton, grown in Pointe Coupee Parish, La.	Do.
200.....	Pelican cotton.....	Horace R. Jones, Arcadia, La.
201.....	Dinkin's short-staple cotton.....	Charles C. Phillips, Greenwood, La.
202.....	Peterkin long-limb cotton.....	A. V. Roberts, Mansfield, La.
203.....	Peterkin cotton.....	A. Robinson, Benham, La.
204.....	Upland short-staple cotton.....	W. W. Sebastian, Spring Ridge, La.
205.....	Long-staple cotton.....	T. A. Womack, Manchac, La.
206.....	Russell's big-boll cotton.....	T. T. Peddy, Mt. Lebanon, La.
207.....	Dixon cotton.....	Z. Abney, Prattville, Ala.
208.....	Pruitt cotton.....	William Adkins, Auburn, Ala.
209.....	Common Alabama cotton.....	E. F. Bonchelle, Boligee, Ala.
210.....	A hybrid cotton: King and Afifi.....	M. A. Bishop, Madison Station, Ala.
211.....	Eureka cotton.....	James F. A. Brien, Burnsville, Ala.
212.....	King cotton.....	John Cantey, Port Mitchell, Ala.
213.....	Truitt's big-boll cotton.....	T. W. Capps, Geneva, Ala.
214.....	S. M. Cathcart's improved cotton.....	S. M. Cathcart, Rehoboth, Ala.
215.....	Sea-island cotton, grown on the uplands of Mobile County, Ala.	L. C. Dorgan & Co, Mobile, Ala.
216.....	Allen's cotton.....	Do.
217.....	Upland cotton.....	Do.
218.....	Cluster-burr improved cotton.....	W. B. Darby, Henderson, Ala.
219.....	Texas storm-proof cotton.....	Hon. R. T. Ewing, Center, Ala.
220.....	King cotton.....	Alabama Agricultural Experiment Station, Auburn, Ala.
221.....	Hawkins's improved cotton.....	Thomas B. Kelly, Kelly, Ala.
222.....	Green-seed cotton.....	Henry Lenz, Leighton, Ala.
223.....	Cotton known locally as big-boll upland.	J. R. McLendon, Naftel, Ala.
224.....	Big-boll cotton.....	Do.
225.....	Storm-proof cotton.....	J. A. Logan, Gordon, Ala.
226.....	Alabama River cotton.....	Mobile Cotton Exchange, Mobile, Ala.
227.....	Alabama upland cotton.....	Do.
228.....	A hybrid cotton: Peerless and green seed.	W. H. Mahan, Randolph, Ala.
229.....	Southern prolific cotton.....	Capt. W. H. May, Kings Landing, Ala.
230.....	Jackson cotton.....	John T. Richards, Pisgah, Ala.
231.....	Long-lint prolific cotton.....	J. W. Roberts, Chandler Springs, Ala.
232.....	Texas ounce-boll cotton.....	W. A. Shipman, Auburn, Ala.
233.....	Christopher's cotton.....	J. P. & J. C. Slaton, Tuskegee, Ala.
234.....	Russell cotton.....	Clark Snow, Oxford, Ala.
235.....	Nankin cotton.....	R. P. Somerkamp, Kamp, Ala.
236.....	do.....	Do.
237.....	Upland cotton.....	Jno. W. Tullis & Co., Eufaula, Ala.
238.....	King's improved cotton.....	W. T. Webb, Alpine, Ala.
239.....	Berry's early big-boll cotton.....	J. L. Berry, Hampton, Ga.
240.....	Upland cotton.....	Thomas H. Buttrill, Jackson, Ga.
241.....	Searsland cotton.....	J. B. Cribb, Manor, Ga.
242.....	Strickland's improved cotton.....	Georgia Experiment Station, Experiment, Ga.
243.....	Todd's improved cotton.....	Do.
244.....	Norris's big-boll cotton.....	Do.
245.....	Prize cotton.....	Do.
246.....	Lee's improved cotton (No. 2).....	Do.
247.....	Culpeper's improved cotton.....	Do.
248.....	Russell's big-boll cotton.....	Do.
249.....	Texas oak cotton.....	Do.
250.....	Texas but cotton.....	Do.
251.....	Schley cotton.....	Do.
252.....	Hawkins's extra-prolific cotton.....	B. W. Hawkins, Nona, Ga.
253.....	Big-boll cotton.....	C. W. Miller, Social Circle, Ga.
254.....	African limbless cotton.....	S. S. Waggoner, Ellenwood, Ga.
255.....	Hilsman's big-boll cotton.....	C. Peteet, Madison, Ga.
256.....	Mallory's lamb-wool cotton.....	Do.
257.....	Peterkin cotton.....	William O. Wadley, Rogers, Ga.
258.....	Boyd's prolific cotton.....	S. S. Sims, Storeville, Ga.
259.....	Hutchins's "Money in the bush" cotton.....	Do.
260.....	Dearing small-seed cotton.....	George T. Smith, Covington, Ga.
261.....	Truitt's cotton, improved by W. S. Curtis.	W. S. Curtis, Thomson, Ga.
262.....	Simpson prolific cotton.....	T. B. Moore, Greensboro, Ga.

List of contributors to collective exhibit of cotton samples—Continued.

Number of exhibit.	Variety.	Exhibitor.
263.	Macon cotton	Thos. Norris, Thomson, Ga.
264.	Jones's improved cotton	Capt. D. H. Sanders, Greensboro, Ga.
265.	African limbless cotton	B. H. Willingham, Thomson, Ga.
266.	Peterkin cotton	W. H. Wright, Greensboro, Ga.
267.	Sea-island cotton	H. A. Pickett, Newberry, Fla.
268.	Peterkin cotton	J. C. Addison, Ruddell, S. C.
269.	Upland cotton	The Adams Cotton Company, Charleston, S. C.
270.	Peterkin cotton	J. C. Addison, Ruddell, S. C.
271.	King cotton	W. R. Ashford, Rockton, S. C.
272.	Bates's little brown seed cotton	R. Bates, Jackson, S. C.
273.	Bates's poor-land seed cotton	Do.
274.	Bates's black seed cotton	Do.
275.	Truitt's cotton	J. W. C. Bell, Renno, S. C.
276.	Sea-island cotton	S. M. Benton, Beaufort, S. C.
277.	Peterkin improved cotton	A. H. Brice, Woodward, S. C.
278.	Improved king cotton	J. W. Callison, Greenwood, S. C.
279.	Russell's big-boll cotton	F. M. Cary, Seneca, S. C.
280.	Peterkin cluster cotton	Robert A. Cary, Whitepond, S. C.
281.	Peterkin cotton	F. M. Cary, Seneca, S. C.
282.	King cotton	E. N. Chisholm, Rowesville, S. C.
283.	Oakgrove cotton	Do.
284.	Peterkin cotton	Do.
285.	do	Do.
286.	Upland cotton	R. W. Chaplin, jr., Rantowles, S. C.
287.	do	Do.
288.	Peterkin cotton	J. J. Carter, Copeland, S. C.
289.	Sea-island cotton	Joseph T. Dill, Charleston, S. C.
290.	do	Do.
291.	do	A. H. Du Pre & Son, McClellanville, S. C.
292.	do	Do.
293.	King cotton	M. E. Ellison, Williamston, S. C.
294.	Hawkins's cotton	Do.
295.	Duncan's mammoth cotton	A. L. Ewbank, Armstrong, S. C.
296.	Peterkin cotton	P. W. Farrell, Blackville, S. C.
297.	Big-boll prolific cotton	Do.
298.	Cluster big-boll cotton	James M. Forrest, Travis, S. C.
299.	Upland cotton	Knoop Frerichs & Co., Charleston, S. C.
300.	Owen's sea-island cotton	Louis F. Fripp, Grahamville, S. C.
301.	Sea-island cotton	Wm. P. Fripp, Grahamville, S. C.
302.	do	Do.
303.	Peterkin and Thomas	John P. Gage, Union, S. C.
304.	Allen's long-staple cotton	B. A. Green, Easley, S. C.
305.	King's early cotton	Do.
306.	Peterkin cotton	W. A. Harden, Chester, S. C.
307.	Peerless cotton	F. J. Harden, Lexington, S. C.
308.	Seabrook cotton	James S. Hart, Stono, S. C.
309.	Peterkin cotton	Rev. J. T. Hiers, Round, S. C.
310.	Sea-island cotton	William G. Hinson, Charleston, S. C.
311.	A hybrid cotton: Jones and King	John B. Jameson, Maynard, S. C.
312.	Cluster Peterkin cotton	L. B. Jeter, Santuck, S. C.
313.	Peterkin cotton	N. C. Joyner, Kingville, S. C.
314-315.	do	J. H. King, St. Paul, S. C.
316.	King cotton	H. S. Lipscomb, Pacolet, S. C.
317.	Big-boll cotton	J. M. Lipscomb, Goucher, S. C.
318.	Peterkin cotton	B. F. Massey, Fort Mill, S. C.
319.	A hybrid cotton: Peterkin and Johnson	R. M. McKay, Cheraw, S. C.
320.	Peterkin cotton	Albert R. Mosely, Salters Depot, S. C.
321.	Russell's improved cotton	A. L. Neely, Warren, S. C.
322.	Truitt's improved cotton	Do.
323.	Brown Texas wood cotton	Capt. John R. Parker, McColl, S. C.
324.	Bullyard XXX cotton	Philip G. Porcher, Mount Pleasant, S. C.
325.	Hawkins's cotton	W. E. Prescott, Franklin, S. C.
326.	Tyler's limbed-cluster cotton	J. C. Richardson, Robertsville, S. C.
327.	A hybrid cotton: Herlong and Peterkin	L. W. Right, Florence, S. C.
328.	Jackson limbless cotton	C. A. Robinson, Rockton, S. C.
329.	do	Dr. W. J. Rivers, Eastover, S. C.
330.	King's early cotton	Do.
331.	Peterkin cotton	J. N. Scott, Wisacky, S. C.
332.	Cole's Peterkin cotton	J. D. Sheldon, Fairplay, S. C.
333.	Sheldon's improved large-boll cotton	Do.
334.	Singleton's prolific cotton	W. L. Singleton, Toddville, S. C.
335.	Hawkins's prolific cotton	Do.
336.	Texas wood cotton	Do.
337.	King's early cotton	T. C. Spencer, Spencer, S. C.
338.	Jones's prolific big-boll cotton	Geo. W. Spencer, Chesterfield, S. C.
339.	King's improved cotton	Charles D. Smith, Warthen, S. C.
340.	Hawkins's cotton	Joseph W. Sullivan, Warthen, S. C.
341.	Tillman's pet cotton	E. D. Tillman, Vanwyck, S. C.
342.	Jones's improved big-boll cotton	T. W. Traylor, Whiteoak, S. C.
343.	Peterkin cotton	Do.
344.	Big-boll cotton	J. F. Watkins, Chappells, S. C.
345.	Russell's improved big-boll cotton	J. A. Weaner, Heath Spring, S. C.

List of contributors to collective exhibit of cotton samples—Continued.

Number of exhibit.	Variety.	Exhibitor.
346	Texas oak cotton	P. J. Wessinger, Boyleston, S. C.
347	Truitt's cotton	H. A. Wingo, Inman, S. C.
348	Peterkin cotton	J. J. Corley, Florence, S. C.
349	Jeter-Dickson cotton	E. W. Jeter, Santuck, S. C.
350	White cluster cotton	Wm. D. Alexander, Croft, N. C.
351	Bagwell's silk-staple cotton	Hardy B. Bagwell, Garner, N. C.
352	North Carolina upland cotton	Barbee & Co., Raleigh, N. C.
353	do	R. H. Battle, North Carolina.
354	Improved extra-prolific cotton	M. J. Battle, Whitakers, N. C.
355	King cotton	Joseph T. Broughton, Garner, N. C.
356	Common North Carolina upland cotton	L. H. Caldwell, Lumberton, N. C.
357	Big-boll cotton	Do.
358	Drake's cluster cotton	Judge Walter Clark, Raleigh, N. C.
359	Williams cotton	Commonwealth Cotton Manufacturing Co., Durham, N. C.
360	King's improved cotton	Crowe Bros., Monroe, N. C.
361	Big-boll cotton	Do.
362	Common North Carolina upland cotton	Do.
363	Improved King cotton	Martin R. Dewstoe, Mount Holly, N. C.
364	King's No. 1 cotton	North Carolina Experiment Station, Raleigh, N. C.
365	Graham's improved cotton	William A. Graham, Machpelah, N. C.
366	Russell cotton	W. H. Gregory, Stovall, N. C.
367	Williams cotton	J. S. Hailey, Raleigh, N. C.
368	Davis cotton	Do.
369	Allen's long-staple hybrid cotton	George R. Harrell, Kelford, N. C.
370	Boyd's prolific cotton	C. W. Johnston, Chapelhill, N. C.
371	King cotton	I. Wiley Jones, Banks, N. C.
372	Common North Carolina upland cotton	Robert E. Lee, Laurinburg, N. C.
373	Williams cotton	George W. Lynn, Durham, N. C.
374	Russell's big-boll prolific cotton	H. McN. Lytch, Laurinburg, N. C.
375	Green seed cotton	H. T. J. Ludwig, Mount Pleasant, N. C.
376	Dixie cotton	J. H. Maske, Polkton, N. C.
377	King's improved cotton	W. A. Mauney, Longshoals, N. C.
378	Jackson's limbless	W. A. Mauney, Kings Mountain, N. C.
379	North Carolina upland cotton	John A. McBride, Laurinburg, N. C.
380	Simpson cotton	L. D. McKinnon, Laurinburg, N. C.
381	Peterkin early cotton	A. J. McKinnon, Maxton, N. C.
382	King's improved cotton	Do.
383	King cotton	Millard Mial, Raleigh, N. C.
384	Peerless cotton	Dr. Matt Moore, Warsaw, N. C.
385	King's improved cotton	J. R. Withers, Davidson, N. C.
386	North Carolina upland cotton	Sanders, Orr & Co., Charlotte, N. C.
387	Little white seed cotton	Dr. R. A. Patterson, Airlie, N. C.
388	Cotton—variety unknown	N. E. Reddull, Raleigh, N. C.
389	Williams cotton	Atlas M. Rigsbee, Durham, N. C.
390	Little king cotton	W. A. Slater, North Carolina.
391	Cotton—variety unknown	J. H. Sloan & Co., Wilmington, N. C.
392	North Carolina upland cotton	Alexander Sprunt & Son, Wilmington, N. C.
393	Peterkin cotton	J. A. Stuard, Troyville, N. C.
394	North Carolina upland cotton	D. A. Tompkins, Charlotte, N. C.
395	King cotton	William S. Turner, Banks, N. C.
396	Hybrid: King and peerless	F. A. Whitaker, Raleigh, N. C.
397	Keno cotton	Delta Cotton Co., Memphis, Tenn.
398	Green seed cotton	Do.
399	Black rattler cotton	Do.
400	Henkel cotton	Dockery & Donelson, Memphis, Tenn.
401	Common upland cotton	Do.
402	Upland cotton	Do.
403	Green seed cotton	Do.
404	do	Do.
405	Black rattler cotton	Do.
406	Long-staple upland cotton	Do.
407	Green-seed cotton	A. J. Folts, Ripley, Tenn.
408	Upland cotton	James E. Goodlet, Memphis, Tenn.
409	Heavy benders	Do.
410	Long-staple upland cotton	Do.
411	Fine-prolific cotton	J. D. Hazlewood, Fayette Corner, Tenn.
412	Tennessee long-staple cotton	J. M. Jones, Somerville, Tenn.
413	Levi's double-boll cotton	M. P. Levi, Weaver, Tenn.
414	Green-seed cotton	L. M. Michell, Tennessee.
415	do	C. S. O. Rice, Orysa, Tenn.
416, 417, 418.	Tennessee upland cotton	J. E. Gilbert & Co., Nashville, Tenn.
419	Storm-proof cotton	J. O. Blakeney, Shawnee, Okla.
420	Ounce-boll cotton	Do.
421	Sea-island cotton (grown on Oklahoma uplands)	Do.
422	Petit Gulf cotton	A. G. Byrd, Omega, Okla.
423	Matagorda silk cotton	Do.
424	Storm-proof cotton	John B. Otto, Tecumseh, Okla.
425	Wiles cotton	McGreen, Altona, Okla.
426	Red Bailey cotton	Do.

List of contributors to collective exhibit of cotton samples—Continued.

Number of exhibit.	Variety.	Exhibitor.
427.....	Storm-king cotton.....	P. C. Lessly, Norman, Okla.
428.....	Storm-proof cotton.....	W. W. Macarty, Choctaw, Okla.
429.....	Five-lock cotton.....	S. C. Maxey, Choctaw, Okla.
430.....	Common upland cotton.....	Oklahoma Cotton Compress Co., Oklahoma, Okla.
431.....	Storm-proof cotton.....	W. J. Price, Jones, Okla.
432.....	Cheatham cotton (grown on river lands of Oklahoma).	Alfred Smith, Oklahoma, Okla.
433.....	Storm-proof cotton.....	Do.
434.....	do.....	J. J. Williamson, Kickapoo, Okla.
435.....	Green-seed cotton.....	Harrison Wright, Omega, Okla.
436.....	Storm-proof cotton.....	L. J. Anderson, Roberta, Ind. T.
437.....	Green-seed cotton.....	Do.
438.....	Ounce-boll cotton.....	C. H. Heald, Healdton, Ind. T.
439.....	Mixed cotton.....	Do.
440.....	Ounce-boll cotton.....	E. L. Myers, Brook, Ind. T.
441.....	White-seed cotton.....	S. M. Thompson, Prestonia, Mo.
442.....	do.....	Do.
443.....	Cotton benders.....	John M. Gillespie, Hard Times Landing, La.
444.....	Peterkin cotton.....	J. M. Warnock, Flournoy, La.
445.....	do.....	Matthew Jones, Chalier, La.
446.....	Laclede long-staple cotton.....	J. M. Johnson, Tallulah, La.
447.....	Texas-Egyptian cotton.....	W. H. Wentworth, Cheapside, Tex.
448.....	A hybrid cotton: Egyptian and upland.	Do.

A strictly commercial exhibit of sea-island cotton was presented by W. W. Gordon & Co., of Savannah, Ga., 18 samples being shown in a pavilion case 2 by 9 feet, 6 feet high. A representative of this company was in attendance at all times to answer questions and to enable interested visitors to examine and take away samples. This was undoubtedly one of the finest exhibits of cotton ever sent out of the United States and it justly attracted the attention of all cotton and fiber experts, manufacturers, and buyers who came upon the space.

Another interesting commercial exhibit of cotton was made by the Indo-Egyptian Compress Company, in close proximity to the Government series of lint cottons. It illustrated the baling of cotton under the Lowry patents, by means of which a density of 50 to 70 pounds to the cubic foot may be secured. The exhibit consisted of one "round bale" of cotton, one full "round bale" of various fibers, straw, and hay, baled in sections, with a mass of loose cotton as it appears when the pressure is released after a bale is broken. It should be noted that the main exhibit of the Indo-Egyptian Company was at Vincennes, where a working plant was erected upon a large allotment of space. This exhibit will be referred to, however, in another part of this report.

An interesting exhibit of models illustrating the handling of cotton in the South was made by the Southern Railway and installed in a handsome 2 by 9 case. The series included a model of a Southern farm wagon, a model in facsimile of a Southern Railway freight car loaded with miniature bales, a model of an old-fashioned cotton press with sweep, accompanied by a working model in metal of a modern compress, besides larger miniature bales illustrating the old bulky 500-pound bale, in which form cotton was usually shipped to market.

The binding-twine exhibits were strictly commercial. Five exhibits of binding twine were installed in this space although classified under Group XIII. The first was that of the Deering Harvester Company, of Chicago. This exhibit filled a 3 by 9 foot pavilion case on the entresol gallery. The central portion of the case was devoted to the binding-twine exhibit proper, arranged upon a highly ornamental structure of ebonized oak, filling the entire height of the case. All stages in the process of manufacturing twine were represented in detail. At one

end were two groups illustrating the source of binding twine, an Indian cutting leaves from a sisal hemp plant and a Filipino securing the crude material from a manila hemp plant, from which the fiber is extracted. At the other end of the case there was a model of a wheat field with a reaper and the binding attachment. Above this was shown the attachment full size and with it models of the human hand illustrating all of the movements required to make the tie in binding the grass. A similar exhibit was that of the McCormick Harvesting Machine Company, of Chicago. In a case of like construction was arranged various models, as follows: In the central section a model of the McCormick binding-twine factory; on the reverse a binding-twine fiber exhibit and a handsome series of photographs in panels, showing factory interiors, etc.; on the top a plaster figure of a farmer with binding twine running through his fingers, coming from figures at other end showing natives at work cutting leaves from sisal hemp and manila hemp plants.

The Aultman Miller Company, of Akron, Ohio, displayed in an upright case, with 3 by 5 feet frontage of exhibit space, a mass of balls of binding twine with hanks of fiber artistically arranged.

The Columbia Cordage Company, of Auburn, N. Y., occupied two panels, or 6 by 5 feet exhibit frontage, with a series of cordage, large and small ropes, binding twine, fiber, etc.

The Northwestern Grass Twine Company made a most interesting exhibit illustrating the manufacture of binding twine, floor matting, etc., from slough grass, a coarse sedge which covers millions of acres of bottom lands throughout the Western States. It was installed in one of the series of 2 by 9 feet pavilion cases which filled the space between the front and rear aisles in the fiber court.

The other fiber exhibits in this section were as follows:

An exhibit of ramie stalks, machine-cleaned ribbons, and degummed fiber prepared by S. B. Allison, New Orleans, La. The exhibit was shown in a panel measuring 2 by 5 feet, under plate glass, uniform with the panels of the cotton series.

The flax exhibits, which were arranged in three 2 by 5 panels, were located by the Museum of the United States Department of Agriculture. The first was an exhibit of flax straw, broken and scutched flax, grown by the Oregon Women Flax Growers' Association, of which Mrs. Julia P. Lord was president. The second was a series of flax straw, scutched and hackled flax, illustrating the series of flax fiber experiments, conducted in 1895 by the special agent of the United States Department of Agriculture, in charge of fiber investigations. The finest grade of flax in this exhibit represented a value of \$500 per ton, as estimated by the Irish flax spinners. The third collection was a historical series illustrating the household flax industry as practiced for the last one hundred years in the United States, though now dying

out, if not already a thing of the past. A photograph in the exhibit showed a flax spinner at the wheel, an old lady in her ninetieth year, this picture having been taken in the mountains of southwestern Virginia about 1892.

Another interesting exhibit was sent by Louis Kohlman, of New Orleans, illustrating the manufacture of vegetable "curled hair" from the Spanish or Southern moss, which is used to a considerable extent in the United States for upholstery purposes.

The Pasadena (Cal.) Ostrich Farm sent a handsome exhibit of plumes, which was displayed in connection with a large photograph of a flock of the birds.

A series of photographs of fiber subjects in portfolios completed the exhibits in the fiber court.

FOOD MILLS AND EQUIPMENT FOR FOOD PREPARATION.

The French classification provided in class 55 of Group X, for exhibits illustrating the equipment and methods employed in the preparation of foods. Among the exhibits considered in the classification were flour mills, bakeries, canning factories, distilleries, and breweries, and in fact all factories and mills in any way connected with food industries. These exhibits were miniature-mill plants in operation, models of mills and factories, plans, drawings, and photographs. But for limitations in space the United States would have had a most attractive exhibit in this class as a number of applications were received for exhibits requiring large areas upon which to operate them. Nearly all were of necessity declined, and this portion of the exhibit therefore related to small appliances that could be given case installation. Two exhibits were installed as follows:

The Enterprise Manufacturing Company of Philadelphia, which filled ten sections of alcove case construction, with a floor space of 300 square feet on the entresol gallery. The exhibit comprised coffee and spice mills in different sizes, meat choppers, sausage machines, cherry and raisin seeders and similar small food mills. Installed with these manufactures, was a series of hardware for domestic uses, such as sad irons, etc. The exhibit was very attractively installed and was one of the features of the entresol gallery.

The North Brothers, also of Philadelphia, displayed on a platform, near the above exhibit, a pyramid of ice-cream freezers showing the many styles and patterns manufactured by this firm.

There were many other exhibits belonging to this class, but not so entered, in the form of photographs of factory interiors, mill plants, elevators, etc., these pictures having been sent as illustrative material to accompany exhibits of the grain industry, displays of canned meats, fruits, and other packing products, the exhibitors' names being duly entered in the classes under which the products were considered. A

special effort was made to secure as full a series as possible of photographs illustrating all food industries, many companies that were also represented with products complying with our request in this matter. It would have been proper to have duly entered this photographic material in the names of the contributors, under class 55, which would have resulted in augmenting considerably the total list of exhibitors in my department, and doubtless also would have given an increased number of awards, as in many instances the pictures sent were bromide enlargements, to the number of a dozen or more, prepared at great expense and displayed in portfolios 22 by 28 inches in size. For a description of the unique system adopted for photographic display, the inquirer is referred to the chapter on installation in this report.

THE COLLECTIVE EXHIBIT OF THE AGRICULTURE EXPERIMENT STATIONS IN THE UNITED STATES AT THE PARIS EXPOSITION OF 1900.

The Agriculture experiment stations in the United States were represented at the Paris Exposition of 1900 by a collective exhibit prepared by a committee of the association of American agricultural colleges and experiment stations. The members of this committee were H. P. Armsby, of the Pennsylvania experiment station, chairman; W. H. Jordan, director of the New York State experiment station; A. W. Harris, president of the University of Maine; M. A. Scoville, director of the Kentucky experiment station; and A. C. True, director of the office of experiment stations of the United States Department of Agriculture.

The exhibit was prepared in cooperation with the United States Department of Agriculture through the Office of Experiment Stations, and was designed to illustrate the methods and results of the work of the stations and the Office of Experiment Stations by means of objects, apparatus, charts, photographs, and publications, arranged to show the main features of the experiment station enterprise in the United States, rather than the work of individual stations. It was handsomely installed on the western end of the entresol gallery, upon a floor space area of about 700 square feet. It occupied four large pavilion cases, three table cases and some 30 feet of wall case construction, besides two bookcases, and table for card catalogue case, etc. It was installed by Walter H. Evans, of the Office of Experiment Stations of the Department of Agriculture, who was detailed to Paris for this purpose. The collections were admirably arranged and fully labeled, a feature being that the exhibit space in the cases was compactly filled with objects, and not merely occupied with wall exhibits in the flat, such as drawings, plans, photographs, etc., a form of installation that was followed in many similar exhibits in Paris.

The following report on the experiment station exhibit was prepared by Mr. John I. Schulte, also of the Office of Experiment Stations

of the Department of Agriculture, and technical expert in agriculture on the staff of the director in charge of Groups VII and X:

The agricultural experiment stations of the United States have made the greatest progress since the passage of the Hatch Act in 1887. The majority of them were permanently established by the enactment of this law. Since then an improvement in their organization, equipment, and efficiency has been very marked. Their number has increased from 46, in 1888, to 56, in 1899. At the Paris Exposition of 1889, when nearly all of the stations were in their infancy, the exhibit made by them consisted of a few modest descriptive notes in bulletin form. The first collective exhibit by the experiment stations illustrative of the methods and results of their work was made at the World's Columbian Exposition in Chicago in 1893. Then, as now, the Office of Experiment Stations and the Association of American Agricultural Colleges and Experiment Stations cooperated in preparing the exhibit, which comprised botany, soils, fertilizers, crops, horticulture, entomology, feeding stuffs, animal nutrition, and dairying. In addition to the general exhibit, there were botanical, biological, and chemical laboratories, in which some of the simpler station operations were carried on by way of illustration. The publications of the stations and of the Office of Experiment Stations were shown, together with photographs and charts illustrating the buildings, equipment, and work of the stations. In connection with this exhibit a popular digest of the publications of the stations was made by the Office of Experiment Stations and published as Bulletin No. 15, entitled "Handbook of Experiment Station Work."

At the Paris Exposition of 1900 the operation of laboratories was entirely out of the question owing to the limited space at our disposal. Nevertheless, as will be seen in the outline of the exhibit given further along, all phases of scientific research in agricultural lines of work were represented. The exhibit was installed in closed cases, thus placing the objects in full view of the visitor and allowing him to examine them from all sides. The closed cases had the advantage of protecting the exhibit from dust and preventing visitors from handling the models and other objects on exhibition, some of which are very valuable and require great care in manipulation. The objects exhibited and their significations are here briefly outlined. The exhibits were not classified or grouped, but so arranged as to show them to their best advantage. The exhibit with reference to soils and soil studies, consisting of apparatus and soil samples, was made by the California and Hawaii stations, supplemented by the Division of Soils of the Department of Agriculture. The soil elutriator, an apparatus for the mechanical analysis of soils, the most important in this connection, designed by Prof. E. W. Hilgard, of the California station, proved to be an object of interest to all agricultural experimenters and soil chemists, all of whom had long been acquainted with Professor Hilgard's successful and valuable work in this branch of agricultural science.

Besides this apparatus samples of six typical agricultural soils of California suitable for the production of wheat, raisins, fruits, garden crops, sugar beets, and citrus fruit were shown, each type of soil being represented by four samples of the first 4 feet of the soil. Samples of 20 grams each of these soils were separated into their mechanical constituents, the analysis having been made by means of the elutriator. The distribution of various soils throughout the State was indicated on a map. In the exhibit from the Hawaiian station, prepared by Dr. Walter Maxwell, were to be found samples of the principal lavas, rocks, agricultural soils, and decomposition products from the craters of volcanoes. In connection with the soils, samples of varieties of sugar cane and agil products obtained in the island were shown. A very valuable addition to the exhibit of these stations was that of the Division of Soils of the Department of Agriculture, which consisted of a number of electric devices designed by Mr. L. J. Briggs, of that division, for determining the salt con-

tent, temperature, and moisture of soils, together with 22 samples of typical agricultural soils of the United States. Several offers to buy these instruments were made, but as there was no authority to sell them, the prospective purchasers were referred to the Division of Soils in Washington.

A series of irrigation apparatus, very instructive and interesting to irrigation engineers and students and teachers of agricultural engineering, was exhibited by the Office of Experiment Stations, under whose general supervision the irrigation investigations of the Department of Agriculture are carried on. Although we have large areas of land in the new and thinly settled portions of our country which can be made fertile only by the practice of irrigation, we are by no means more interested in this line of work than some of the countries of the Old World which have been settled for centuries. The exhibit contained a number of water registers used in measuring the amount of water flowing through streams, flumes, and ditches; a current meter for measuring the rate of water flow, and a hydrophore applied in the determination of the amount of silt carried by water. This apparatus was designed by Prof. Elwood Mead, irrigation expert in charge of irrigation investigation for the Department of Agriculture, and for many years State engineer of Wyoming. Other objects exhibited in this connection comprised specimens of sheet-steel pipes, extensively used in irrigation in rough and hilly regions, where they replace ditches or flumes; models of a Cippoletti weir and a measuring flume, used to determine the amount of water that passes through them; models of a truss and flume, illustrating by what means water may be conducted across a canyon, and a set of photographs, showing irrigation structures and results of irrigation, which were also admired as works of art. Other irrigation scenes and structures used in irrigation engineering, with detailed drawings of the more important ones, were shown on charts.

The objects on exhibition relating to the culture of dairy bacteria comprised 48 species isolated from various dairy products. These cultures, some of which have become a commercial article in the dairy world, were prepared by Dr. W. H. Conn, and exhibited by the Connecticut Storrs Experiment Station. They proved of special interest to bacteriologists, special dairy bacteriologists, and scientific dairymen. This exhibit was retrospective, inasmuch as it contained the original Babcock milk-testing machine and its subsequent and latest modified forms. This machine was designed in 1888 by Dr. S. M. Babcock, of the Wisconsin station, for the rapid determination of the percentage of fat in milk. Another device for testing the effect of pressure on the preservation of milk was exhibited by the West Virginia station. There was also a series of models designed to show the varying sizes of cheese made from equal quantities of milk, but of different fat content, exhibited by the New York station. These objects were supplemented by a set of sheets showing one day's milk-producing records of the different breeds of cattle tested at the Columbian Exposition by a committee of station officers; by charts illustrating the specific nature of galactose as a cheese-ripening ferment, as indicated by results obtained at the Wisconsin station, and by charts showing the results of investigations as to the source of milk fat, conducted by the New York State station. Representative of botanical and other investigations the experiment-station exhibit contained 200 objects exemplifying the simplicity, inexpensiveness, and rapidity of modern methods, and showing how comparatively recent inventions have revolutionized the dairy industry. The two modern forms of machines, the Facile and the Russian Babcock, show how the machine and its accessories have been improved, but the principle upon which the test is based remains the same in all the machines. They drew the attention of station workers and dairymen, all of whom were of course acquainted with Dr. Babcock's work. Other things contributed by the Wisconsin station comprised a set of glassware and minor apparatus. An overflow pipette and a milk-sampling tube, designed by Dr. M. A. Scoville, station director, was shown by the Kentucky experiment sta-

tion. The California station contributed a pressure apparatus used in experiments, samples of olive pits used in the classification of varieties, together with 50 samples of olive oils, showing the effect of different methods of manufacture. The exhibit also included a collection of the seeds of 100 of the more common weeds of the United States, arranged by Dr. B. D. Halsted, of the New Jersey station; 18 of the more common leaf-spot diseases, illustrated and presented by the Massachusetts station; an auxanometer used for determining and automatically registering the rate of plant growth, and a transpiration apparatus for measuring the rate of transpiration of plants, both instruments designed by Prof. L. C. Corbett, of the West Virginia station; a collection of 72 selected and crossbred varieties of cotton, made by the Alabama station; a centrifuge, designed by Dr. J. C. Arthur, of the Indiana station, to be applied in experiments in vegetable physiology for ascertaining the effect of gravity and centrifugal force on germinating seeds; and a number of root cages, demonstrating the distribution of the roots of maize, wheat, flax, and brome grass when grown under normal conditions. These cages, prepared by the North Dakota experiment station, proved a very popular exhibit and very effective in showing the extent of the root development of these staple crops. This subject was further elucidated by illustrations sent by the Wisconsin station, showing the distribution in the soil of the roots of maize, clover, apple trees, raspberries, and other plants.

For the horticulturist the exhibit contained models of sweet potatoes, peppers, apples, and plums, illustrating the varietal differences of these fruits and vegetables, sent by the Iowa and Minnesota stations; and models of grapes designed to show the effect of pollination upon self-fertilizing varieties, exhibited by the New York State station. These models were asked for by a number of schools and museums, a fact which speaks for itself. Among other things in this line may be mentioned a model of a wine cooler, an apparatus used for rapid cooling of wines in the process of manufacture, exhibited by the California station.

Models of a respiration calorimeter and a bomb calorimeter were exhibited by the Connecticut Storrs Experiment Station. These devices, brought to their present state of perfection by Prof. W. O. Atwater and his staff, are used in the study of foods and feeding stuffs—the respiration calorimeter to determine the metabolism of matter and energy in the human body, the boucle calorimeter to determine the heat of combustion of foods, feeding stuffs, and other substances. This exhibit was of interest to chemists and the food specialists, a number of whom studied it carefully. We regret very much to say that, through no fault of our own, the model of the respiration calorimeter did not arrive until July 13, a circumstance which prevented the jury and numerous other persons interested in this line of scientific research from seeing it.

Among exhibits relating to chemical investigations may be mentioned a gas desiccator, designed by Prof. L. W. Johnson, of the Connecticut State station; a very interesting and valuable collection of chemically pure vegetable proteids, separated from the seeds of the various plants by Dr. F. B. Osborne, of the same station; and a series of samples of animal and vegetable fats, together with data relative to their physical and chemical properties, contributed by the Missouri station. Besides the already long list of exhibits enumerated, we may mention as specially worthy of note those having reference to the feeding and breeding of animals. Models of silos showing methods of construction were sent by the Cornell and Wisconsin stations; and a series of objects, models, and illustrated charts showing the results of breeding and feeding experiments were exhibited by a number of different stations. In addition to this material exhibits, charts, and photographs illustrating the results of investigations at different experiment stations were shown. There were portfolios containing photographs of the directors and staffs, buildings, grounds, laboratories, experimental plats, apparatus, etc., of the individual stations, showing their facilities

and equipment for work. There was an exhibit showing the typical office of experiment stations. In addition, publications were sent by the office of experiment stations, consisting of a complete set of the published works of that office and of the individual stations throughout the United States to the number of 566 volumes. Books and monographs by authors connected with the stations were shown to the number of 138 volumes, and a card index of experiment-station literature, in which the results of the investigations of different stations are indicated on 19,000 cards, as prepared by the Office of Experiment Stations. There were also press notices, posters, and miscellaneous publications shown in portfolios. The most striking feature in connection with the exhibit of publications was the volume entitled *Agricultural Experiment Stations in the United States*, a report on the history and present status of agricultural experiment stations, prepared by the Office of Experiment Stations. This work was distributed only among officials of agricultural ministries and persons having direct connection with agricultural colleges and experiment stations. The collection of publications served not only as an exhibit but also as a source of information on agriculture in the United States to those in attendance. On several occasions these publications were consulted by scientists visiting the Exposition.

I am glad to report that almost every visitor paid a flattering compliment to the experiment stations of the United States Department of Agriculture in remarks on their progress and the splendid showing made at the Exposition. Many of the visitors admitted that the United States was now the leader in experiment station enterprise. A noted scientist, on being told that the American stations were still comparatively young, replied that that made but little difference, since in progressive America institutions and establishments rapidly reached their maturity. He further remarked that the exhibit compared very favorably with other exhibits of like nature at the Exposition. The visitors to the exhibit were numerous, and the persons who carefully examined it included scientists, agricultural writers, officials of agricultural departments, and ministries, directors in charge of the agricultural exhibits of the different countries, members of agricultural schools and colleges, agricultural engineers, managers and superintendents of estates, students from agricultural institutions, and experiment-station workers from all parts of the world.

JOHN I. SCHULTE,

Technical Expert for Groups VII and X.

THE WEATHER BUREAU.

The importance of presenting a complete working Weather Bureau exhibit in Paris was early considered in the general scheme outlined for my department, the chief obstacle to the successful carrying out of which was the lack of suitable accommodation in any of the buildings in which space was available. It was then proposed to erect a special building for the purpose, and it was possible before the Commissioner-General left Paris in the fall of 1899, to obtain from the French authorities a suitable allotment of ground space for such a building, located just in the rear of the palace erected for the merchant-marine exhibits. The lack of sufficient funds to erect fine United States buildings in Paris seemed for a time to preclude any possibility of carrying out this project, though at a later date the matter was satisfactorily adjusted, and the Weather Bureau exhibit in Paris in 1900 was practically assured.



F-21. UNITED STATES WEATHER BUREAU EXHIBIT, MARINE ANNEX, SHOWING PRINCIPAL RECORDING INSTRUMENT EXHIBITS, CHAMP DE MARS.

Willis L. Moore, the Chief of the Weather Bureau, having been authorized by the Secretary of Agriculture to prepare a suitable exhibit, Charles F. Marvin was instructed to undertake the details of the work of preparation. The exhibit scheme originally contemplated the establishment of a full working weather station, and in preparing the building plans accommodation for a complete series of roof instruments was therefore considered. It was also intended to publish in some form a daily weather map for the purpose of illustrating in a practical manner the steps by which the daily reports of the weather are prepared for dissemination to the public. The great cost of the complete scheme, however, especially if carried out in a foreign country, necessitated an abridgement of the original plans, the roof display being confined to the outdoor instruments actually required as accessories to the working of the record instruments on the main floor. The printing office, though complete in every detail, was likewise installed as a dead display, which, of course, prevented the actual publication of a daily weather map.

I here take the liberty of explaining that exhibits illustrating the weather service seemed to have been unprovided for in the French official classification, though our exhibit was finally entered as belonging to Group VII, class 38, to be considered under the clause "Institutions for the promotion and advancement of agriculture," this group and class also including agricultural experiment stations and laboratories, agrologic, agronomic, and climatic charts, plans, diagrams, publications, etc. Meteorological instruments were considered in Group III, class 15, "Instruments of precision," entries in this class referring to manufacturers' exhibits of instruments and not to their scientific use. In the case of the Weather Bureau the exhibit material refers to a system of scientific observations and publications for the benefit of agriculture and commerce, the apparatus and accessories for display being everything from a photograph or book to a flag, an instrument of precision, or a printing press. For this reason the Weather Bureau exhibit was entered in Group VII, class 38, as the most logical place for it under the French classification.

The building in which the Weather Bureau exhibit was installed was occupied conjointly with the exhibit of the United States Post-Office Department, and covered an area of about 5,000 square feet of ground space. The gross floor space available for the Weather Bureau was 2,260 square feet, the stairway in the center utilizing a large block of space.

Charles F. Marvin, professor of meteorology, Mr. O. L. Fassig, and Mr. E. G. Johnson were detailed to Paris to install the exhibit, the two last-named officials to remain in charge. Mr. Fassig was later replaced by Mr. F. J. Walz, who, with Mr. Johnson, remained until

the close of the Exposition and superintended the packing for return. The following report on the exhibit was submitted by Mr. Walz:

REPORT ON THE UNITED STATES WEATHER BUREAU EXHIBIT AT THE INTERNATIONAL EXPOSITION IN PARIS, 1900.

The exhibit embraced three sections, which will be described in detail separately, namely:

I. Climatic and meteorological charts, photographs of clouds and cloud-observing apparatus and of kites and aerial apparatus, publications, meteorological text-books, etc.

II. Charts, maps, engravings, etc., illustrating the methods employed in forecasting the weather; the methods used in preparing daily weather maps; the system of transmitting and collecting the meteorological data daily by telegraph; and the manner of disseminating forecasts and warnings.

III. Instruments and apparatus.

I.—CHARTS, PUBLICATIONS, AND PHOTOGRAPHS.

The collection of 28 charts exhibited graphically and generally the average and salient features of the climatic conditions prevailing throughout the United States as compiled from observations since the organization of the weather service in 1871. These charts show for January, July, and the year, the normal barometric pressure, the normal temperature, the mean maximum, and the mean minimum temperatures and the normal percentage of sunshine; the highest and the lowest temperatures recorded at the various meteorological stations, and the normal precipitation for the year and the spring, summer, autumn, and winter seasons.

A collection of 6 charts exhibited the movement of a cyclonic disturbance from the central Rocky Mountain region to the St. Lawrence Valley (April 3 to 5, 1892), and illustrated the development and movement of a typical storm. A collection of 8 charts (added later) showed the path, development, and movement of the tropical storm which destroyed Galveston, Tex., swept north through the central portion to the Lake Region and thence out to sea in the vicinity of the Gulf of St. Lawrence, and was finally felt in northern Europe.

The separate charts were specifically described by the legends thereon.

There were also exhibited photographic records of sunshine, the original records of kite observations made by the automatic meteorograph carried in the kite, and record sheets from automatic rain gauges, barographs, thermographs, and Marvin's normal barograph.

The publications exhibited embraced a set of the current documents now regularly issued by the Weather Bureau and consisted of the following regular issues: Washington daily weather map (lithographic); daily weather maps issued at stations (chalk-plate process); daily weather maps issued at stations (cyclostyle process); Washington climate and crop bulletins (weekly); climate and crop bulletins issued at section (State) centers (monthly and weekly); lake charts issued monthly during season of navigation; monthly weather review; annual report of the Chief of the Weather Bureau; snow and ice charts issued at Washington weekly during the winter season; miscellaneous bulletins, etc.; bound volumes of a single monthly report from each station of the Weather Bureau, both regular and voluntary stations, and a number of special reports.

The text-books included a set of selected publications relating to meteorology and agriculture, mostly those furnished to stations as text-books and works of reference. Also Volume I, Report of the Maryland Weather Service and Meteorology of Maryland.

The photographs embraced various types of clouds and of kites, and aerial instruments and apparatus.

II.—FORECASTING PROCESSES, SYSTEM OF COLLECTING TELEGRAPHIC REPORTS, METHODS OF PREPARING AND PRINTING DAILY WEATHER MAPS, AND DISSEMINATION OF FORECASTS AND STORM WARNINGS.

This exhibit embraced a chart showing graphically the system of telegraphic circuits employed in reporting weather observations; a complete file of telegrams in cipher from 131 stations as received at the central office in Washington and furnished forecast division for January 12, 1900; a translation of the first ten lines of the first sheet of cipher telegrams (illustrating the conciseness and accuracy of the meteorological cipher code used by the United States Weather Bureau), and a series of four manuscript charts compiled from these telegrams, which are read at sight by the translator, and the appropriate data immediately recorded on the several charts.

A set of four books of original manuscript forecast charts for the month of February, 1899, based on the telegraphic daily weather reports, and which charts are studied by the forecast official in making weather predictions. This exhibit showed the form in which meteorological information is placed before the forecast official in order to give him a clear conception of the actual conditions of the atmosphere at a certain time, together with the changes and processes which have led up to this condition, so that he may by properly correlating these facts, and with his knowledge of storm characteristics, storm movements, and general air currents deduce with a decided degree of accuracy the sequence of weather that should reasonably be expected over any section of the country covered by the reports during the following period of thirty-six or forty-eight hours.

These manuscript forecast charts were: (1) A chart showing the meteorological conditions from observations taken simultaneously at some 130 to 140 stations scattered throughout the country. The meteorological conditions reported are temperature, pressure, wind velocity and direction, state of the sky, rainfall (since last observation). Also on this map are charted isotherms (in blue), or lines of equal temperature, and isobars (in red), or lines of equal barometer. (2) A chart showing changes in atmospheric pressure (reduced to sea level) since the two preceding observations; also the departure from the normal. (3) A chart showing the changes in air temperature since the two preceding observations, and the departure from the normal. (4) Chart showing the kind and amount of upper and lower clouds and their direction of movement, together with the direction of the surface winds.

The successive steps in the preparation and printing of weather maps by (a) the lithographic process, (b) the chalk-plate process, and (c) the cyclostyle process were fully exhibited.

(a) The lithographic process exhibit fully illustrated the numerous transfers to the lithographic stone, and impressions which must be made before the finished lithographic map is completed. These transfer sheets include one for temperature lines, another for pressure lines, others for the symbols showing direction of wind and state of sky, dotted lines in red inclosing areas in which marked changes of temperature have occurred since the preceding observation, stipple areas or shading showing the areas in which precipitation fell since the preceding observation, numerical tables, the complete synopsis and forecasts, etc. These finished maps leave the press within two and a half to three hours from the time the observations were taken at the stations. The lithographic map is printed only in the Washington office. At the other stations issuing a daily weather map, of which there are now 91, either the chalk-plate engraving or the cyclostyle process is employed.

(b) In the chalk-plate process the following exhibit was made: The blank chalk plate, the smooth steel plate coated with a preparation of adhesive chalk having a proper consistency to admit of engraving any desired design through the chalk down to the plate; an engraved chalk plate, a plate with lines, symbols, and other data constituting a weather map engraved thereon; casting box, apparatus employed in taking casts of weather maps engraved on chalk plate; gas stove, employed in melt-

ing type metal and heating casting box and engraving; scroll saw, employed in rapidly trimming off superfluous margins around the type metal casts; a sample of type metal cast as finished map, showing the lines and data in relief. The weather forecasts and tabular matter are set up in type and, with the stereotype map, made into a form. A completed form was shown in the exhibit, together with a printing press, electric motor, and complete cabinet of type, which are a necessary part of the equipment of stations printing maps by the chalk-plate process.

(c) The cyclostyle map is a weather map written upon a sheet of prepared paraffined paper faced with a protecting web having a gauze-like texture. The writing is done by means of the ordinary typewriter, except that special characters are added to the keys so that the direction of the wind and the state of the sky may be represented on the map as desired. The writing and drawing produce fine perforations in the sheet, through which a thin printing ink may be forced so as to make a clear impression of everything written or drawn on the stencil.

In this process of producing the daily weather map the stencil frame and all accessories, together with a copy of map printed from a stencil, were exhibited.

The forecasts are printed on all forms of the weather map, but further they have a much wider distribution through the mails by means of large display postal cards. These cards are quickly printed by hand stamp with the use of rubber logotypes, and as they bear an official frank which carries them free of postage they are given a wide and liberal distribution through cooperation with the Post-Office Department. A complete outfit for carrying on this work was shown in the exhibit.

In addition, the daily forecasts of weather and temperature are disseminated by means of flag displays. A complete set of the flags employed was exhibited. They are: Square white flag (fair weather); square blue flag (general rain or snow); square flag, half white and half blue (local rain or snow); black pennant (temperature) displayed above the weather flag indicates warmer, and when below colder, and square white flag with square black center (cold wave) indicates sudden and decided falls in temperature.

Storm-signal flags are displayed during the daytime and signal lights during night at seaport stations of the United States (including lake port stations) to give warning of the approach of winds dangerous to shipping. A complete set of the storm signals was shown in the exhibit. The storm flag is a large square red flag with black square center. The directions from which the dangerous winds are expected are indicated by combinations of pennants (one white, one red) with the storm flag. Two storm flags displayed together give warning of the approach of a hurricane.

The signal lights are large semiprismatic lanterns, lighted by incandescent lamps of 100 to 200 candlepower. Two colors are used: One a red light displayed alone indicates storm winds from an easterly direction; the other white, but always displayed with and above the red, indicating storm winds from a westerly direction. Oil-burning signal lanterns are used where electric currents can not be obtained. These lanterns were shown in the exhibit.

III.—INSTRUMENTS AND APPARATUS.

All the instruments and self-registers employed at the regular Weather Bureau stations were exhibited, together with several designed for special work. They may be mentioned in brief detail as follows:

(1) *Instruments for measuring the pressure of the air.*

(a) Normal mercurial barograph, designed by Prof. C. F. Marvin, United States Weather Bureau. The characteristic feature consists in a mercurial barometer tube of large diameter poised in equilibrium in an automatic balance. Changes in the pressure of the air are compensated by a movement of a rolling carriage on a balanced beam, while a recording pen connected with the carriage traces on the record



F-23. GENERAL VIEW OF HORTICULTURAL SPACE, UNITED STATES ANNEX, LOOKING NORTH.

sheet all the movements of the carriage and thus of the changes in the pressure of the air. This instrument records air pressures in the most accurate manner.

(b) Aneroid barographs, recording continuously the pressure of the air and used at over 120 stations of the United States Weather Bureau.

(c) Ordinary nonrecording mercurial barometers and standard pattern of boxes for holding them while in use. This style of barometer is supplied to each of the Weather Bureau stations.

In the exhibit was also displayed two mercurial barometers with the cisterns cut out in sections to show the construction.

(2) *Instruments for registering the temperature of the air.*

(a) Tele-thermographic transmitters and registers, designed and manufactured by M. Jules Richard, Paris, France. These instruments are a form of thermometer which transmits electrically its indications to a register and produce thereby a record of the temperature at a distance. Two sets of these instruments were exhibited: One transmitter was installed in the instrument shelter on the roof and connected electrically with the register in the main exhibit and produced there a continuous record of the temperature outside. The other transmitter and register, especially designed for exhibition purposes, were operated on short circuit placed on a table among the main exhibits.

(b) Thermographs—instruments also designed by M. Jules Richard, Paris, France, which produce automatically a continuous record of the temperature of the air and which are used at over 100 stations of the Weather Bureau. Two of these instruments were among the exhibits, one installed in instrument shelter on roof of exhibit building, the other mounted in a glass case, more clearly exposing the mechanisms, displayed on table below.

(c) Maximum and minimum thermometers, the maximum indicating the highest and the minimum the lowest temperatures since the last setting. These types of thermometers are used at more than 3,000 stations of the United States Weather Bureau.

(3) *Instruments for measuring the moisture contents of the air.*

(a) The whirling psychrometer, consisting of two mercurial thermometers mounted on a geared apparatus for whirling them rapidly through the air. The bulb of one of the thermometers is covered with a thin muslin. This muslin is moistened and the instrument whirled until the wet bulb, cooled by evaporation, has reached a minimum. The humidity or moisture content of the air is then deduced from the difference in temperature shown by the wet and dry bulb thermometers.

(b) Sling psychrometer, a portable form of the whirling psychrometer.

(4) *Instruments for measuring precipitation (rainfall and snowfall).*

(a) Marvin's weighing rain and snow gauge. This apparatus consists of two parts, (1) the weighing gauge and (2) the recorder or register. These parts are connected with each other and a battery by a circuit of three wires of insulated copper. The gauge is usually placed on the roof and when connected with the register the latter traces a complete record of the rate, amount, time of beginning and ending of precipitation, whether rainfall or snowfall. Two sets of this instrument were exhibited. One weighing gauge was installed on roof and connected with corresponding register in main exhibit. The other was installed in main exhibit and connected electrically with its register, in short circuit, and the action of both shown by the artificial dropping of water into the weighing gauge.

(b) Tipping-bucket rain gauge (collector and register), designed by Prof. C. F. Marvin, United States Weather Bureau. The main feature of this pattern of pluviograph is the pivoted bucket which tips and electrically records whenever a quantity

of water representing one-hundredth of an inch of rainfall is received therein. This apparatus was exhibited in duplicate. One collector was installed on roof to catch and measure actual rainfall, while the other was installed below connected on short circuit with its register, and their action shown by artificially dropping water into the collector.

(c) Standard 8-inch rain and snow gauges, the standard type of nonrecording gauge and support used at over 3,000 United States Weather Bureau stations was exhibited in duplicate, one set being installed on roof and the other in main exhibit. In this form of gauge the total amount of rain collected since last observation is measured by means of a graduated stick and the gauge emptied after each observation. During snowfall the lower part only of the gauge is exposed. The snow collected is melted and then measured as rainfall by the stick.

(5) *Instruments for measuring and registering the (1) velocity and (2) direction of the wind.*

(a) Standard pattern Robinson anemometers. One of these instruments was exposed on the top of a lofty mast on roof of building and recorded electrically the movements of the wind in miles per hour on the meteorograph. Two additional instruments were placed in the main exhibit.

(b) Standard Weather Bureau wind vanes which record electrically the direction of the wind. Eight directions are recorded with four contact springs. A model vane with full-sized electrical contacts illustrating the mechanism employed was displayed in main exhibit, while a complete working vane was installed on mast on roof and connected electrically with meteorograph.

(6) *Instruments for recording duration of sunshine.*

(a) Thermometric sunshine recorder, a form of differential thermometer with black and bright bulbs. This instrument was exhibited in duplicate. One was installed on roof of building and recorded electrically actual sunshine on station meteorograph, the other being displayed in main exhibit.

(b) Photographic sunshine recorder. A form of the Jordan photographic sunshine recorder, Weather Bureau construction. The time and duration of daily sunshine, for the period of one month, are traced photographically on sensitized (ferro-prussiate) paper contained within the instrument. Actual records obtained by this instrument in the United States were shown.

(7) *Meteorograph.*

A register connected electrically with apparatus installed on roof of building and with which more than 100 important stations of the United States Weather Bureau are equipped. This instrument produces automatically the following records:

(a) Direction of the wind each minute; (b) each mile of wind movement, with the time in which made; (c) each hundredth of an inch of rainfall and time required to collect; (d) duration of sunshine and cloudiness during time sun should shine.

Two-magnet register. A form of meteorograph that electrically records the same as the meteorograph, with the exception of wind direction.

(8) *Instruments and apparatus used in cloud observations.*

(a) Cloud theodolite, complete, designed by Profs. C. F. Marvin and F. H. Bigelow, United States Weather Bureau, and used by the Bureau in making the international cloud observations, 1896-97.

(b) Cloud nephoscope and support designed by Prof. C. F. Marvin, United States Weather Bureau. This instrument is a mirror form of nephoscope, and the following measurements on clouds can be made with it: The azimuth, the angular altitude, the direction of motion and the apparent velocity of motion.

(9) *Instrument shelter, standard pattern.*

Used by all regular Weather Bureau stations, installed on roof of building. All thermometers for obtaining air temperature are exposed in this form of shelter, wherein they are screened from the sunshine and rain as well as direct radiation, but at the same time freely exposed to the air, the temperature of which it is desired to ascertain.

(10) *Kites and aërial apparatus.*

This exhibit embraced complete sets of the self-recording instruments, reels for handling wire, and a full-sized kite used in exploring the meteorological conditions of the upper atmosphere. The entire apparatus displayed (and, in fact, all the instruments and apparatus used by the Weather Bureau in securing meteorological observations by means of kites) were invented and designed by Prof. C. F. Marvin, United States Weather Bureau. The improved form of Hargrave kite employed is also his design. The exhibit included the following:

(a) *Kite*.—Full size standard Weather Bureau pattern, an improved form of the Hargrave kite. Dimensions of the medium size kite (size generally used at Weather Bureau stations) are:

	Ft.	In.
Transverse width of kite	6	6
Length over extreme edges fore and aft	6	8½
Distance between top and bottom supporting surfaces	2	8
Width of cloth bands	2	2

(b) *Kite meteorograph*.—An instrument of unusually light weight (weighing with case and all about 2 pounds) to be carried aloft by kites for the purpose of automatically recording meteorological conditions of the upper air. It registers a record of (1) the velocity of the wind (when connected electrically with the kite anemometer); (2) the temperature of the air; (3) the pressure of the air, and (4) the percentage of moisture in the air.

Actual records traced by the kite meteorograph up to 7,000 feet were shown in frames on the wall.

(c) *Automatic kite reel*.—A reeling apparatus for controlling the long lines of steel piano wire used in flying kites. The line automatically adjusts itself to the shifting directions of the wind. The tension on the line is automatically indicated and may be constantly recorded. Dials show the length of wire played out, and its angular inclination to the horizontal plane at the reel are indicated by the radius rod and graduated arc. The reel is driven by a steam engine or other power, but may at any moment be operated by hand. The wire is automatically distributed upon the drum in a special manner that prevents entanglement or self-injury under heavy tension.

(d) *Hand kite reel*.—A hand-reeling apparatus used at kite stations of the United States Weather Bureau for controlling kites in flight. Dials indicate the length of wire unwound; a graduated arc and radius rod indicate the inclination of the wire to the horizontal plane, and a dynamometer attached to one of the crank handles indicates the tension on the line.

(e) *Kite altazimuth*.—A horizontal mirror mounted on leveling screws for use in observing the angular elevation and azimuth of kites.

The United States Weather Bureau exhibit was installed during the month of April and opened to visitors for inspection in completed condition May 15. The building remained open and the exhibit was accessible to visitors every day except Sundays from 9 a. m. to 6 p. m. during the time from May 15 to September 30, and from 9 a. m. to 5.30 p. m. during the month of October. It was necessary to close a half hour earlier during the month of October on account of darkness, there being no way of lighting the building artificially.

The exhibit was visited by many thousands of people, among whom were meteorologists and those interested in related sciences, from all parts of the civilized world. The cloud photographs, the method of making weather forecasts, and the kite and aerial apparatus attracted special attention.

Many interested in aeronautics and air explorations examined the kite exhibit in detail, taking photographs and measurements of the kite instruments and apparatus. Notable among these were a number of officers of the German, French, Italian, and Japanese armies and navies.

During the meeting of the International Meteorological Congress, which assembled in Paris, representative meteorologists from nearly all parts of the world, a special invitation was extended to its delegates and members to visit and inspect the Weather Bureau exhibit. This invitation was accepted and the exhibit thus brought to the attention of those mostly interested in meteorological work and, consequently, the methods, instruments, etc., of the United States Weather Bureau.

It has been the special effort of those connected with the exhibit to explain and set forth in the strongest and clearest light possible the aims and methods of the United States Weather Bureau and its practicability and great economic value to the people of the United States and of North America, special stress being given to the great importance (which has become a necessity) and value of its weather forecasts and warnings.

It is to be regretted that on account of the expense and lack of funds for the necessary cablegrams the daily weather map (of the United States), as originally planned, could not have been printed and issued daily in connection with the exhibit. It is also to be regretted that a concise pamphlet or catalogue descriptive of the exhibit was not prepared and printed for distribution, as there was a great demand for something of this kind.

It is recommended that an issue of a thousand or so of this report be printed and made available for distribution to those who may desire the information covered therein, many having left their addresses, to be furnished with such printed information in the event of its becoming available.

As a result of the visit of the jury of awards and their critical examination of the United States Weather Bureau exhibit, the exhibit was awarded a grand prix. Also, gold medals were awarded to Prof. C. F. Marvin and Prof. A. J. Henry, both of the United States Weather Bureau; Professor Marvin for meteorological and aerial instruments and Professor Henry for cloud photography.

Respectfully submitted.

F. J. WALZ,

*Local Forecast Official and Section Director,
in Charge United States Weather Bureau Exhibit, Paris.*

GROUP VIII.—HORTICULTURE AND ARBORICULTURE.

In the assignment of space for the American exhibition in Paris very small provision was made for horticulture—in fact, the original allotments overlooked Group VIII altogether, and the subsequent area set apart for the United States consisted in a gross area of only 2,500 square feet, nearly one-half of which was taken up with obligatory aisles. Even after the area of this allotment was known it was impossible for months to secure any information as to the ground plans, form of construction of the building, or other details which were necessary to the intelligent planning of suitable installation. And when the plans were received there seemed to be so many restrictions regarding the use of the space, and the complication of different floor

levels and stairways between, that the plans for Group VIII were the very latest to be worked out. It was then found that the actual space available for cases and exhibits was so small that it would be impossible to carry out the complete and systematic exhibit scheme which had not only been devised, but partially carried out.

It was a great satisfaction to me, however, to learn on my arrival in Paris, early in February, that an attempt was being made to reallocate the foreign horticultural space, with a view of making an international arrangement of space and exhibits for picturesque interior effect. The fact that our exhibit material was to be largely fresh fruit made it impossible for the United States to consider such a scheme for a moment. Our protest was then made, and the final result of several conferences on the subject was the granting to the United States of the entire oval pavilion on the western end of the palace of horticulture, with an area of 3,525 square feet, Italy having been given the vestibule on the east.

Our case material, which had been worked out for a rectangular space, was planned for a crowded installation, and was wholly inadequate to the requirements of the new space. An entirely new floor plan was therefore worked out. With the increased space, the oval form of the building lent itself to an original scheme for setting the cases, which utilized the outer space next the glass, leaving the central portion open for the construction of an ornamental centerpiece high enough to balance the exhibits. This central structure, with its arrangement of living plants, was not intended to serve as an ornament alone, but also to afford space, out of sight of visitors, for storage, for the unpacking of material, as it was received through the season for the different competitions, and for desk room for office purposes. No special description of this feature of the installation is necessary, as the accompanying illustration gives a very good idea of its proportions and appearance.

The table installation was in the form of five pedestals supporting raised tiers of steps with plate-glass risers, upon which to display the plates of fruit constituting the exhibit. There were also eight cases, each covering 2 by $4\frac{1}{2}$ feet of floor space and 6 feet high, in which were installed the series of fruit models and the commercial exhibits of seeds, nuts, etc. Two octagonal pedestals for fresh fruit and three table cases with racks for photographic exhibits completed the installation. About 1,000 square feet of floor space was occupied with actual exhibits.

While the French classification was followed as closely as possible in devising the exhibit scheme for this group, a complete exhibition of American fresh fruits was contemplated. Under the law placing the collection of exhibits in Groups VII, VIII, and X under the direction of the Secretary of Agriculture, it was possible to

secure the assistance of experts from the United States Department of Agriculture in exploiting our resources in Paris. Accordingly, the pomologist of the Department, G. B. Brackett, was placed in the immediate charge of the work of exploitation in Group VIII. We were ably assisted by Mr. William A. Taylor, the assistant pomologist. These gentlemen entered with enthusiasm upon their work in May, 1899, and from that time to the close of the Exposition they were indefatigable in their efforts to make a creditable and successful exhibit in Paris, and to advance our trade interests abroad in matters relating to Group VIII, especially that part of it illustrating the fresh-fruit trade.

The exhibit was installed by Mr. Taylor, who, as horticultural expert in charge, remained in Paris until midsummer. He was then relieved by Colonel Brackett, who remained in Paris until the space was cleared and the return material was repacked for shipment. Both gentlemen also rendered efficient service as members of the jury that considered the exhibits of nursery stock and those of fresh fruits shown in the series of competitions held during the season. Another efficient member of the horticultural staff was Mr. H. M. Dunlap, of Illinois, who not only rendered valuable aid in the collection of exhibits in this country, but also assisted materially in the general work of installation and in the subsequent effort of the Commission to impress upon Europeans the high quality of our fruits. I wish also to render my hearty thanks to Mr. J. M. Buisson, of Paris, who courteously aided our representatives in many ways in connection with our horticultural exhibits.

Under the official classification Group VIII, horticulture and arboriculture, comprised six classes, as follows: Class 43, appliances and methods of horticulture and arboriculture; class 44, vegetables; class 45, fruit trees and fruit; class 46, ornamental trees, shrubs, plants, and flowers; class 47, greenhouse plants; class 48, seeds and plants for gardens and nurseries.

In addition to the permanent horticultural exhibits, a series of 12 temporary competitions was held in classes 44, 45, 46, and 47 of this group. These competitions, as announced and held, began on the following dates: April 18, May 9 and 23, June 13 and 27, July 18, August 8 and 22, September 12 and 26, and October 10 and 24. These dates were announced a year or more in advance of the opening of the Exposition. Each competition began on Wednesday and continued for five days, after which exhibits could be removed at the option of the exhibitors. Jury consideration on such exhibits could be had only upon the first day of each competition. This circumstance seriously inconvenienced foreign exhibitors, whose shipments could rarely be so timed as to reach the Exposition in prime condition for inspection and award on the basis of actual merit.

Submitted herewith is the joint report of Pomologist G. B. Brackett

and Mr. William A. Taylor, horticultural experts in my department, in charge of this group:

In arranging for proper representation of American horticulture and horticultural products, serious difficulties were encountered at the outset. The perishable nature of flowers, vegetables, and fruits had limited their exhibit at former international expositions almost entirely to such as could be transported from greenhouse, garden, or orchard to the exhibition tables within the period of a few hours. The large and growing importance of the horticultural industries of the United States rendered it highly desirable for the country at large to make a representative showing. The Commission therefore determined at an early date to give American exhibitors in this group all assistance and encouragement possible. Press notices and circulars announcing this intention were given wide circulation during the early part of 1899, and exhibits in all of the six classes were solicited. The main effort of the expert in charge, however, was directed toward securing strong representations in classes 43 and 45, as it was believed that exhibits in these classes would be of greater commercial importance than in the others.

CLASS 43.—*Implements and methods of horticulture and arboriculture.*

Implements and photographs of horticultural scenes were the special features of the exhibits in class 43, a total of thirty-seven distinct exhibits in this class being collected and installed. Three of these consisted in horticultural implements, the other thirty-four consisting in sets of horticultural photographs, prepared by individual exhibitors, covering representative views illustrating horticultural scenes and operations in the United States.

Some of the subjects illustrated in sets of these photographs were as follows: Horticultural ornamentation of dooryards in villages, cities, and on farms; ornamentation of factories, homes of workmen, railroad stations, hotels, etc.; landscape features of celebrated public parks, cemeteries, private grounds, etc.; commercial production of flowers, vegetables, and horticultural seeds; products of farm gardens and orchards; commercial orchards, vineyards, small-fruit plantations, and packing houses; methods of packing and transporting fruits, etc. These photographic exhibits were found to create great interest among European landscape architects, fruit growers, and dealers who visited the Exposition, and proved to be an important feature of the group exhibit.

Twenty-two States and the District of Columbia were represented in this class. It is gratifying to note that thirty-one premiums were awarded to our exhibits in this class.

CLASS 44.—*Vegetables.*

Owing probably to the lack of commercial incentive, no acceptable exhibits were offered in class 44. A shipment of sweet potatoes, made by the Secretary of Agriculture, was displayed during the two temporary competitions held May 9 and May 23, and attracted much attention from visitors. This excellent vegetable is apparently little known in European markets.

CLASS 45.—*Fruit trees and fruits.*

As the culture of fruits for market has attained vast proportions in the United States, and seems destined to assume even greater importance in the near future, it was determined that the fruit exhibit should be made the leading feature of this group. Plans submitted by the expert in charge were approved and heartily supported by the director of the group, Mr. Charles Richards Dodge, and were closely adhered to from the beginning. According to these plans a continuous exhibit of American fresh fruits was contemplated, which was to last from the opening to the

close of the Exposition. Choice samples of the more durable fruits of the crop of 1899 were to be placed in refrigerated storage as harvested, and held for withdrawal for exhibition throughout the Exposition. They were to be supplemented with samples of the crop of 1900 as they matured in different sections of the country. The apple and the orange were selected as the leading fruits for these exhibits on account of their preeminent commercial importance.

It was decided at the outset that all sections of the country should have equal opportunity to display their pomological products. In order to encourage exhibits the Commissioner-General, upon the recommendation of the expert in charge and the approval of the director, authorized the announcement that all expenses of transportation, refrigeration, and installation of exhibits in this class would be defrayed by the Commission. Announcement of the general plan was made early in the summer of 1899 by means of press notices, circulars, and letters addressed to State commissions, horticultural societies, and individual fruit growers throughout the country. Some of the more important fruit-growing States were visited by the expert in charge, and others by Mr. H. M. Dunlap, president of the Illinois State Horticultural Society, who had been appointed by the Commissioner-General to aid in collecting exhibits.

The response from fruit producers was most gratifying. Horticultural societies in several States also sent large collections, supplementing the donations of fruit made by growers with considerable quantities of choice fruit purchased with society funds. The National Apple Shippers' Association indorsed the plan, and storage establishments in several States offered free refrigerated storage for exhibits as long as it should be needed. An almost total failure of the apple crop in several important sections, and the unprecedented heat of the late summer and autumn considerably reduced the quantity of fruit actually stored, leaving several States entirely unrepresented. However, the close of the year 1899 found a total quantity equal to about 300 barrels safely stored in seven different storage warehouses situated at Leavenworth, Kans., Kansas City, Mo., Chicago, Ill., Champaign, Ill., Leroy, N. Y., Martinsburg, W. Va., and Washington, D. C. This fruit, which consisted chiefly of apples, had been gathered from seventeen States, and was produced by more than 200 growers. The largest collections were made by the State horticultural societies of Illinois and Missouri and the New York State commission, each of these organizations having undertaken to furnish a sufficient supply to maintain a continuous State exhibit. The California State commission agreed to furnish a continuous supply of apples and oranges throughout the Exposition, and to supplement these with regular shipments of deciduous fruits of the crop of 1900 after the middle of July.

All fruits, except those from California, were wrapped, packed, and shipped to the several storage houses that had been selected, under instructions from the expert in charge, though many of the details of this work were left to the individual packers. In a few instances paid collectors were employed for a short time to secure exhibits from States in which the horticultural societies had not the means to carry on the work. All shipping labels, catalogue sheets, stencils, paper for wrapping, etc., were furnished by the Commission free of charge. The collection, shipment, and installation of fresh fruits from California was left entirely to the commission from that State, in accordance with the expressed desire of that body.

In addition to the exhibit of fresh fruits, several permanent exhibits of nuts, comprising almonds, pecans, and walnuts were secured. One exhibitor of pecans, the Woldert Grocery Company, of Tyler, Tex., generously contributed 300 pounds of choice samples for distribution. These were judiciously distributed in neat paper cartons, and resulted in many inquiries regarding this nut, which is practically unknown in European markets.

The California State commission prepared and forwarded a fine exhibit of fruits and vegetables in preserving solutions in glass jars.

The Division of Pomology of the United States Department of Agriculture displayed a collection of about 800 facsimile models, arranged in groups, of the more

important varieties of fruit grown in different sections of the United States, with map labels showing the areas of commercial production. This collection received high praise from European pomologists, and was generally conceded to excel all similar collections displayed at the Exposition.

No exhibits of nursery stock or growing fruit trees were made in the American section.

CLASS 46.—*Ornamental trees, shrubs, plants, and flowers.*

Owing to the difficulty of transporting and maintaining permanent exhibits in this class, few were offered. Two were finally installed, under adverse conditions, on plats assigned to the United States adjacent to the basin of the fountain in front of the Trocadero palace. One of these consisted in a large collection of dahlias by Lothrop & Higgins, East Bridgewater, Mass., the other being a collection of dahlias and gladioli by the Michigan Seed Company, South Haven, Mich.

In the fourth temporary competition, held June 13, a collection of fifty varieties of sweet peas in bloom was exhibited by W. Atlee Burpee & Co., Philadelphia, and awarded a "First Prize." This exhibit was grown in the vicinity of Paris from seed furnished by Messrs. Burpee & Co., and was installed in the American section by the well-known French seed house, Vilmorin, Andrieux & Co.

CLASS 47.—*Greenhouse plants.*

A single exhibit, consisting of specimen plants of two new varieties of *Nephrolepis* ferns, was made by Mr. Nicholas Studer, Washington, D. C. Owing to delay in transit during the hot weather of July these plants suffered severely from the confinement.

CLASS 48.—*Seeds and plants for gardens and nurseries.*

Two exhibits were made in this class. Trumbull & Beebe, San Francisco, Cal., displayed a collection of vegetable seeds comprising about 150 varieties and were awarded a silver medal.

The Michigan Seed Company, South Haven, Mich., displayed a collection of vegetable seeds and flowering bulbs, which was awarded honorable mention.

TRANSPORTATION, STORAGE, AND INSTALLATION.

Preliminary investigation having revealed the fact that cold storage for fruits was practically unknown in France, suitable accommodations were provided in which to store the surplus fruit for withdrawal as needed from time to time to replenish the exhibit. Three cold-storage rooms, with a combined capacity of approximately 3,500 cubic feet, were constructed in a meat-storage establishment at Havre, at the expense of the Commission, with a view to the possible utilization of a portion of the space for refrigeration of meat and dairy exhibits in case of necessity. No cold-storage service existing between the United States and France, a compartment was secured on the steamer *St. Paul* of the American Line, sailing from New York March 14, 1900, for Southampton. Just previous to that date the fruit was collected by Mr. Dunlap in New York from the seven storage establishments previously mentioned, refrigerator cars being used in transportation. On the steamer it was held at a temperature of 33° F., the temperature at which it had been held in most of the storage establishments. Cold-storage service being unobtainable between England and France, the forward hold of a small steamer was utilized in conveying the shipment from Southampton to Havre, where it was landed March 23, 1900. Including the transfer of 1½ miles on carts from the wharf to the warehouse at Havre, the fruit was out of refrigeration during this shipment for an average time of about twenty-four hours. This had been recognized as the most critical period of the shipment, for any considerable exposure of the fruit to the atmospheric conditions existing at that season

would have seriously impaired its keeping quality. The arrangements for it were made by Mr. William A. Taylor, assistant pomologist of the United States Department of Agriculture, who had been in immediate charge of the collection of the fruit exhibits and who was detailed to proceed to Paris early in March to superintend their installation. Special credit is due to the American Line which carried this exhibit in refrigeration at a reduced rate, and particularly to the officials of the company at New York, Southampton, and Havre who rendered all possible aid in connection with the necessary transfers at those points.

The palace of horticulture, in which most of the indoor exhibits of the group were located, is a permanent structure of iron and glass, erected on the north bank of the Seine, opposite the street of Nations. The building consists of two rectangular sections, placed end to end, but separated by a wide open plaza decorated with flower beds and statuary. Each section is terminated at the end opposite the plaza by an elliptical dome, about 70 by 50 feet in ground dimensions, and about 40 feet in height. The eastern section of the palace was occupied entirely by French exhibits and the western one mainly by foreign countries. In addition to the United States, Great Britain, Austria, Hungary, Italy, Germany, and Russia were represented in it.

The space originally assigned to the United States consisted of a rectangular area 26 by 100 feet in size, extending across the main hall of the foreign section. Several months of correspondence having indicated that this assignment was permanent, handsome oak and glass cases for the display of the exhibits were designed and constructed to suit this rectangular space. Late in February a general reallocation of space in the foreign section was ordered, and Director Dodge was successful in securing for the United States the full area of the western dome, with a floor space of approximately 3,500 square feet. This was the largest space assigned to any foreign country, and the most conspicuous in location. Although the transfer involved radical changes in the plan of installation as originally contemplated, it resulted advantageously for the exhibit, as it left us free from the interference of partitions.

All of our plans had been made with the intention of completing the installation, including a full show of fresh fruit in time for the formal opening of the Exposition on April 1. Upon Mr. Taylor's arrival in Paris, March 15, however, he found the portion of the building assigned to the United States merely an incomplete skeleton of ironwork, upon which but slow progress was being made. Strong representations regarding the importance of hastening completion were at once made to the Exposition authorities through the Commissioner-General, and repeated at frequent intervals. Finding that only a dirt floor was provided for in the plans, lumber was purchased and a substantial floor of wood was laid at the expense of the Commission. The same course was afterwards taken by Great Britain, Austria, and Italy. This caused a marked diminution in the amount of dust and dirt resulting from the daily presence of large crowds of people, and made it possible to keep the exposed exhibits reasonably clean and free from dust.

Notwithstanding the efforts put forth to hasten the completion of the building, the formal opening found it but partially under roof, and it was some days later before there was sufficient protection against the weather to permit the beginning of installation. Delicate exhibits like the wax models and fresh fruits could not be displayed until protection against the direct rays of the sun was provided. This had been promised by the authorities when the space was accepted, but there being no indication of speedy completion, a screen consisting of some 300 yards of burlap was made early in May, and placed over the dome, as a temporary protection. Under this shelter, which was replaced by permanent wooden curtains, designated "claire," about June 1, the cases were set up and the exhibits installed in time for the second temporary competition, which opened May 9.

As a substitute for the cases that had been previously constructed for the space originally assigned, a central rectangular structure with rounded ends was con-

structed and covered with dark green cloth. Against the outside of this were built sloping display tables for the exhibition of fresh fruits in commercial packages. The interior afforded a small but convenient storeroom for surplus fruit, which was unpacked as needed to replace specimens that had spoiled on the tables. A partially concealed upper story afforded room for a small desk and other necessary office features. The perpendicular lines at the ends of this structure were broken by massing a few palms and decorative plants against them, and a light cornice near the top was similarly decorated. The exhibits of models, nuts, and horticultural seeds were installed in eight small pavilion cases, each $4\frac{1}{2}$ by 2 feet, and 6 feet in height, with sides and ends of plate glass. The fresh fruits were displayed upon the receding shelves of five rectangular pyramidal cases. Four of these were 14 feet long by 5 feet wide and 5 feet 6 inches high. The other was 18 feet long, 5 feet wide, and 5 feet 6 inches high. All of these cases were sparingly decorated with small palms and with California fruits in jars. Two octagonal pyramidal cases, each 5 feet in diameter, were devoted to decorative exhibits of California fruits in preserving solution in glass jars, interspersed with bright-colored fresh fruits, shown regardless of variety. For the display of citrous fruits in mass the California commission erected two columns 15 feet in height and about 2 feet in diameter, on bases 4 feet square and 3 feet high. These columns were covered with oranges and lemons, retained in position by inconspicuous wire holders, and constituted a very striking feature of the exhibit. These were maintained from early in June until about September 1, when they were taken down, the supply of oranges having been exhausted.

All photographs were installed in portfolios, each holding twenty-four mounts of the standard size, 22 by 28 inches. These were placed on shelves in three desk-like cases with flat tops upon which they could be readily opened for examination.

All cases, except the central structure, were of quartered oak, finished in bronze green.

TEMPORARY COMPETITIONS.

From the prominence and magnitude of the fresh-fruit exhibit, interest naturally centered upon it. In the French section no attempt was made to show fruits for a longer period than five days at a time on the dates of the several temporary competitions, and aside from the United States, Canada, only in the foreign section, attempted any continuous display of fresh fruits. Grave doubts were entertained and expressed by the group officials whether such a display as was contemplated could be maintained by any country, and its successful continuance throughout the season with fruit grown from 3,000 to 5,000 miles away was openly scouted. It is perhaps well to record at this time that we had sufficient stock in reserve to maintain a creditable exhibit throughout the season with fruit of the crop of 1899, in case a crop failure in 1900 had cut off our supply. That this was possible was largely due to the rapid development and improvement of facilities for refrigerating and transporting perishable products in the United States during the past twelve or fifteen years.

As jury action upon these exhibits could only be had upon the first day of each competition, it became necessary to install as large a number of collections as possible at each time, holding sufficient fruit in reserve to replenish the exhibits until the date of the next competition. Withdrawals from the storage depot at Havre were accordingly made about five days in advance of the several competitions, in order to provide for transportation to Paris and installation. Much difficulty was experienced at times in securing prompt delivery, as the fruit, like other exhibits, was shipped in bond, and was escorted, even when on carts, by customs officers. This caused frequent and considerable delays in delivery. Payment of duty at the port of entry, which would have released the fruit from routine supervision and escort, would probably have been the simpler and better plan.

The jury having justly ruled that no specimen could be considered in competition for more than one award, even as a part of a general collection representing the country at large, the following plan was adopted and followed in each competition: Exhibits of societies, commissions, and individuals were installed separately in each competition, the space assigned to each being as nearly as possible proportioned to the quantity and quality of the fruit furnished from the several States represented. At the same time a general collection, composed of single-plate samples taken from each lot of each variety in each of these exhibits, was installed in the name of the Division of Pomology of the United States Department of Agriculture. Thus without loss of the individuality of his exhibit each exhibitor contributed to the general collection, where his fruit could be carefully compared with that of other producers of the same variety from different sections. Incidentally this plan gained to the United States 11 more first prizes than would have been secured otherwise.

Practically all awards made to fruit exhibits were to collections of considerable size. Contrary to the practice at expositions in the United States, no single-plate awards were made except in a few cases, mostly in the French section, consisting of fruits newly introduced or not yet known to commerce. This practice materially reduced the number of awards that would have come to the United States had the precedents at Philadelphia, New Orleans, and Chicago, as well as at the minor American expositions, been adhered to. But inasmuch as it applied to the exhibits of all countries, including France, it probably did not materially lessen the proportion of awards that came to the United States.

Labels were printed in Washington for each lot of fruit of the crop of 1899 recorded on the catalogue sheets forwarded by contributors. Each label contained the name of the variety, the name and address of the grower, the name of the organization or individual making the exhibit, and an outline map of the United States, with the State in which the sample was grown indicated by a star. These labels proved of great service in impressing upon visitors the magnitude of our fruit industry and the wide diversity of location of our commercial fruit districts. Taken with the specimens to which they related they demonstrated, without a word of explanation or interpretation, the idea that we sought to impress upon the visitor, namely, that America is a land of fruits, and can supply the world with fruit products of beautiful appearance and high quality at reasonable prices during practically the entire year.

During the early summer of 1900 arrangements were made for forwarding some of the more perishable fruits as they matured, in shipments timed to reach Paris for installation in the competitions as they occurred. The first of these, which consisted of summer apples, pears, and peaches from New York and Delaware, left New York August 8th, reached Paris August 18th, and was displayed in the temporary competition of August 22d. Three subsequent shipments, comprising apples, peaches, pears, and plums from fifteen States, were made on August 29th, September 12th, and September 26th. The total number of packages shipped was 176, equivalent to about 100 barrels. The packages containing the softer and more perishable fruits in these shipments were carried in the ships' refrigerators, through the courtesy of Mr. B. F. Kobbe, east bound freight agent of the American Line. It is gratifying to note that no shipment was longer than ten days in transit from New York to the Exposition building in Paris, while one was delivered in eight days and nineteen hours. Most of these fruits were well packed and reached their destination in fine condition. A few packages of mixed fruits, apples, pears, plums, and peaches, which through a misunderstanding were not refrigerated, spoiled in transit. The collection and transfer of these exhibits was in charge of Mr. Taylor, who returned to Washington early in July, being relieved of the superintendence of installation of exhibits upon the arrival of G. B. Brackett, expert in charge. Not one of the exhibits failed to reach the Exposition in time for installation on the dates fixed.

For complete list of exhibitors of permanent exhibits in this group see Appendix A; for awards on permanent exhibits see Appendix B; for list of exhibitors in temporary competitions see Appendix C; for awards on exhibits in temporary competitions see Appendix D; for medal equivalents of awards on exhibits in temporary competitions see Appendix E. These appendixes will be found as Appendix II, Vol. VI.

PROBABLE EFFECTS OF THE EXHIBIT.

The very general interest aroused by the horticultural exhibit gives ground for the belief that it will exert a marked and favorable effect upon the demand for American fruits in European markets. Thousands of visitors had never before seen American apples or oranges. Americans who had resided in Paris for twenty years stated that they had not seen American apples there during that period. Expressions of praise of the beauty and fine aroma of the fruit were heard on every side, and while general distribution of samples was not permitted nor attempted, the general comment of the members of the jury and others who tasted them was distinctly favorable to the quality of both apples and oranges. The attendants in charge received frequent calls from dealers in Germany, Holland, Denmark, Norway, Sweden, Austria, and Great Britain for addresses of dealers in American fresh, dried, and canned fruits, and in many instances expressed their intention to place experimental orders this year. Several leading fruit dealers of Paris expressed similar intention, and will undoubtedly place orders direct or secure American fruit in the English markets, where it is already obtainable in large quantities.

The commercial importance of the exhibit was constantly kept in mind in installation, both as regards quantity and arrangement. Rarely was there a smaller quantity than 1,000 plates of bright, clean fruit on exhibition in the American section, although there were competitions in which the entire display of fruits grown in the open air, in all the other sections, France included, did not exceed one-fourth of that quantity, and not until late in summer did the total quantity shown by all other nations equal that of the United States.

Some interesting facts that are likely to have an important bearing upon the future development of the fruit trade in France were observed. One of these was the evident favor with which apples of yellow or russet color are regarded by consumers. Red apples are looked upon with distrust by the French, and bring lower prices in the Paris market than yellow or russet fruit, being considered inferior in quality. Another was the entire absence of the barrel as a package for apples in the French market. To acquaint consumers with the appearance of apples in this form, sections representing newly opened barrels of several varieties of apples were kept on exhibition constantly. In like manner standard boxes of California oranges of the different counts were also displayed. A very general disbelief that the fruit shown was produced in America existed during the early weeks of the Exposition, many visitors considering it impossible to hold fruit over from the previous year in such excellent condition. These contended that such fruit could only come at that season from Australia, Tasmania, or Cape Colony, where the crop was at that time being harvested. It is evident that a rather strong prejudice against refrigerated products exists upon the continent, but this will undoubtedly grow less as the economy and safety of this method of handling becomes more apparent to consumers.

ACKNOWLEDGMENT OF ASSISTANCE RENDERED.

No report upon the horticultural exhibit would be complete which failed to recognize the invaluable assistance rendered by the fruit growers, horticultural societies, storage men, and transportation companies of the United States, whose united and patriotic efforts made the successful completion of the enterprise possible. Special credit belongs to Mr. H. M. Dunlap, who rendered important assistance in the col-

lection, transportation, and installation of the general exhibit in addition to the collection of exhibits from his own State of Illinois, and to Mr. L. A. Goodman, secretary of the Missouri State Horticultural Society; Mr. L. M. Blakely, vice-president of the New York State Commission, and Mr. L. A. Emlay, of the California State Commission, who superintended the collection of the fruit from their respective States.

The relations of the officers in charge with the representatives of other countries represented in the group were at all times most harmonious. The decisions of the juries were in almost all cases fair, and the awards generous to American exhibitors. The treatment of your representatives by the Exposition officials was at all times most courteous and deserving of sincere thanks.

HORTICULTURAL IMPLEMENTS.

Space for American horticultural implements (class 43) was allotted on the quay level, designated the "sous-sol" of the palace of horticulture. Two exhibits were made as follows:

Coldwell Lawn Mower Company, Newburg, N. Y. Exhibit of lawn mowers. This exhibit consisted of a full assortment of commercial samples of hand and horse power lawn mowers. It was the most complete exhibit of its kind in the Exposition, and was awarded a silver medal by the jury.

S. L. Allen & Co., Philadelphia, Pa., exhibit of Planet Jr. cultivators, wheel hoes, seed drills, etc. This exhibit consisted of a globe, revolving automatically by electric motor, bearing upon its equatorial belt models of a number of the implements made by this firm, while several of the full-sized implements were operated by mechanical devices also run by electric power. A small garden filled with artificial plants afforded opportunity for an attendant to show the practical working of the hand-power implements. This was the only automatic-working exhibit in class 43, and it attracted much attention from visitors. It was awarded a gold medal.

THE RETROSPECTIVE EXHIBIT OF HARVESTING MACHINERY BY THE DEERING HARVESTER COMPANY, IN THE PALACE OF AGRICULTURE.¹

Among the many retrospective exhibits prepared by the French Government, or proposed for acceptance by other nations participating in the Exposition of 1900, none held a more important place in illustrating the world's progress in the mechanical arts during the past one hundred years than the superb display of models of harvesting machinery prepared by the Deering Harvester Company, of Chicago, Ill.

¹ All reference to priority of conception or ingenuity of invention, development or perfection of parts or entire harvesting machines, descriptions or reference to such conceptions, inventions, features of machines, statements made in catalogues or on exhibit labels, and dates, have either been supplied by the exhibitors or compiled from data submitted by them, and the exhibitors are therefore responsible for all such statements.



F-25. VIEW OF HORTICULTURAL-IMPLEMENT SECTION, GROUP VIII, LOOKING EAST.

In the fall of 1898, when the Commissioner-General made his first visit to Paris, it was arranged that such a retrospective exhibit should be made a leading feature of the United States agricultural display, and 1,000 square feet of space was set apart for its installation in the Palace of Agriculture, where, at that time, it was expected that all of our exhibits in Groups VII and X would be located on a total allotment of 18,000 square feet of space. Subsequently additional ground space was secured from the French Exposition authorities upon which to erect a special building for agricultural machinery with a total floor space of 15,000 square feet, this building, afterwards erected, being known as the United States Agricultural Annex.

The models necessarily were the main feature of the display. It was thought, however, that such a large series of models, even if greatly interesting in themselves, might be enhanced by the addition of other features; and among the suggestions offered were the addition of sketches showing a conception of the manner of operation of ancient and early mowing and harvesting machines, supposing them to be operative, these to form the background of the alcove-case installation; enlarged photographs of harvest scenes in many parts of the world, in which the various harvesting machinery manufactured in the United States, without regard to makers, might be shown in actual use. These suggestions were carried out without regard to expense, the department dictating the manner of installation and the form and arrangement of the plate-glass cases, in which the exhibit as a whole would be displayed.

This retrospective feature of the agricultural display in the Palace of Agriculture occupied space in the northwest corner of the United States section, under the entresol gallery. It was installed in ebonized-oak cases of handsome pattern, the entire exhibit occupying seven large pavilion cases and some running alcove-case construction placed against the north wall and at right angles to these across either end of the space, which was 72 feet long.

The entire collection embraced individual exhibits to the extent of over 200 numbers, these relating to models, water-color pictures, photographic enlargements, and portraits. The water colors were 30 in number, forming the background of the wall cases.

To show to the fullest extent that what is now enjoyed by the agricultural world is due to the efforts of the inventors of the closing century, 56 photographs, 18 by 22 inches in size, were suspended in the middle cases. These pictures showed the machines of the different United States manufacturers operating in all of the countries where modern methods have been introduced, as far east as India and west as far as Australia and New Zealand.

The working models, which made up the major part of the exhibit, were one-fifth and one-sixth size. They related to grain and grass harvesting machines, embodying the inventions that formed the principal links in the chain of evolution of these machines down to the

present time. Each model was connected with electric power in such manner that any visitor examining the exhibit might put any piece of mechanism in motion at will. All models were made with the greatest care, and were finished with such exceeding nicety that all parts moved with precision.

While the limited space of this report will not allow even simple descriptions of the many beautiful models making up the sum total of this unique collection, concerning which a volume could be written, it may prove of interest to refer to the description of a semimechanical means of harvesting resorted to by the Gauls, as told by Pliny, which was shown in a miniature model, No. 76 of the catalogue. This was practically a box mounted upon wheels, having thills at the rear, pushed by a single ox. At the front of the box was a comb-like extension that gathered the heads of cereals and pulled them from the stalks. A man beside the machine with a hoe-like instrument scraped the accumulating heads from the horizontally placed comb-like attachment into the receiving box. No one fact shows better what the ingenuity of man hath wrought during the closing century than that from the time of this machine (made and used about the time of the birth of Christ) no attempt to accomplish the so long-desired result by mechanical means is known to have been made until the closing years of the eighteenth century. Even then only suggestions were made, and those mainly in England. Machines of the forms then proposed have never proved of any practical value.

In compiling the data given, with the list of models which follows, this department has made use of the official catalogue sheets, which were required to be made up and submitted before exhibits were shipped abroad, the system of cataloguing each exhibit item on a single sheet, as employed in the department of agriculture and food products, supplying the official records of the exhibits in this department. It should be stated that the labels accompanying the models, and which were prepared by the Deering Harvester Company, were only intended to record the simple title of the machine, the name of the inventor, and date of invention, with an occasional brief explanation to the extent of one or two lines. Some of these labels, however, were changed during the course of the Exposition, at the request of those whose machines were represented in several of the models.

LIST OF MODELS.

1. Patrick Bell's reaping machine as manufactured in 1856.
(For Bell's machine of 1826 see model 81.)
2. Obed Hussey's reaping machine, 1833.
3. Hussey's reaper, as manufactured and sold in the Western States of America between 1833 and 1850.
4. Hussey's reaper, as manufactured in England.
5. Hussey's reaper, self-raking reaper manufactured by Jack & Son, Maybole, Scotland.

6. Abram Randall's reaper of 1833. This machine was adapted to cut the grain and permit the raker to deliver gavels to the ground ready for being bound.
7. Enoch Ambler's mowing machine, patented in the United States December 23, 1834. This machine did not come into general use because its cutting apparatus was defective.
8. McCormick reaper. A United States patent was granted to Cyrus H. McCormick June 21, 1834.
9. Ferdinand Woodward's reaper, patented in the United States September 30, 1845.
10. C. H. McCormick's reaping machine, patented by C. H. McCormick in 1834. Alternative construction of the patent manufactured by the predecessors of the McCormick Harvesting Machine Company, of Chicago. Testimony in the records of the Patent Office shows that McCormick first operated this machine in 1831.
11. Ferdinand Woodward's cutting device, for which Hussey's cutting apparatus was substituted in the Woodward reapers.
12. Esterly header. This reaping machine was patented in the United States to George Esterly October 22, 1844.
13. McCormick reaper. This reaper was patented in the United States to C. H. McCormick January 31, 1845. This machine was drawn by a team and the grain was raked from the platform by a man walking beside it.
14. Rugg's cutting apparatus for reapers. This modification of Hussey's cutting device of 1833 rendered the latter better adapted to cutting of grain.
15. Cook's reaping machine. This machine was patented in the United States November 20, 1846. The improvement consists in a combined reel and rake. By it the grain is not only reeled to the cutting apparatus, but delivered to the ground.
16. McCormick's reaping machine. The improvements in this machine were patented in the United States to C. H. McCormick October 23, 1847.
17. Danford's mowing machine. This machine was patented in the United States to E. Danford September 17, 1850.
18. Pease's self-raking reaper. This machine was patented in the United States to F. S. Pease November 14, 1848. It formed one of the earliest types of platform rakes.
19. Palmer & Williams self-rake. This machine was patented in the United States to Palmer & Williams February 4, 1851, and in various forms came into immediate practical use.
20. Haines header. This machine was patented to Jonathan Haines March 27, 1849. It was adapted to cutting very high and took little more than the heads of the grain.
21. Seymour's self-raking reaper. This machine was patented in the United States to William H. Seymour July 8, 1851. It was designed to remove the accumulated grain from the platform of the reaper at intervals and deliver it rearwardly and sidewardly.
22. Watson, Renwick & Watson's automatic binder. A United States patent was granted May 13, 1851, to Watson, Renwick & Watson. This was one of the first known suggestions to bind grain automatically as cut by reaping machine.
23. Hurlbut's gavel sizing reaping machine. This machine was patented in the United States to S. S. Hurlbut February 4, 1851.
24. Ketchum's mower. This mowing machine was patented in the United States to William F. Ketchum February 10, 1852. It was intended to cut grass only.
25. Watson & Renwick's automatic grain binder. A United States patent was granted to Watson & Renwick December 6, 1853. This machine was designed to cut the grain, elevate it over the main supporting wheel and deliver it to a binding receptacle and bind with twine.
26. Seymour's self-raking reaper. This machine was patented in the United States to William H. Seymour March 28, 1854. It was designed to remove the accumulated

gavels rearwardly and sidewardly to the ground. It may be considered as an improvement on Mr. Seymour's former machines.

27. Wheeler's mowing machine. This machine was patented in the United States to Cyrenus Wheeler February 6, 1855. The improvement consisted in supporting the cutting apparatus in such a manner that it could rise and fall to conform to the undulations of the ground.

28. Haines mower. This machine was patented to Jonathan Haines September 5, 1855.

29. Wood's reaping machine. A United States patent was granted March 20, 1855, to Walter A. Wood for improvement in reaping machines.

30. Manny reaper. A United States patent was granted to John H. Manny January 1, 1856, for improvement in reaping machines. This patent may be considered to show the many improvements invented by Mr. Manny.

31. Dorsey's self-rake reaper. A United States patent was granted to Owen Dorsey June 24, 1856.

32. Aultman & Miller's mowing machine. This machine was patented in the United States to Aultman & Miller June 17, 1856. It was designed to cut grass only.

33. Kirby's self-raking reaper. Several United States patents were granted to William A. Kirby. This model represents that patented to him September 2, 1856. This model represents one of the simplest forms of Kirby's machines.

34. Whiteley's reaping machine. This machine was patented in the United States to William N. Whiteley November 25, 1856. The machine was designed to rake the grain automatically and deliver it rearwardly and sidewardly to the ground.

35. Marsh harvester. This machine was patented in the United States to C. W. & W. W. Marsh August 17, 1858. The grain was delivered to a receptacle, adjacent to which was a stand for the operators and tables upon which the grain might be bound.

36. Miller's mowing machine. This machine was patented in the United States to Lewis Miller May 4, 1858. Its cutting apparatus was adapted to rise and fall in passing over the ground.

37. Buckeye mower. This model represents a modified form of Aultman & Miller's mower as designed by Thomas S. Brown for Adriance, Platt & Co., of Poughkeepsie, N. Y.

38. Nishwitz's mowing machine. This mowing machine was patented in the United States to Frederick Nishwitz February 16, 1858. The invention consists in securing the cutting apparatus to a supplemental frame.

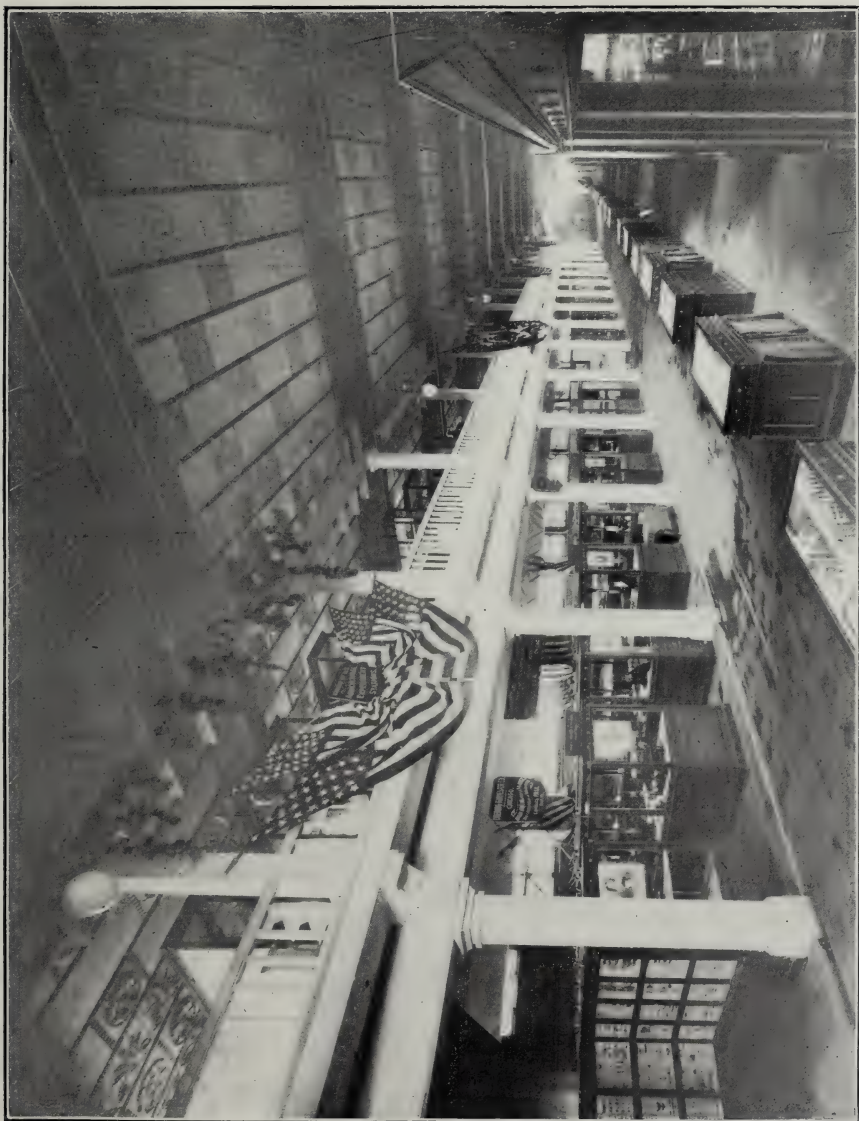
39. Hussey's improved one-horse mowing machine. This machine was patented to Obed Hussey in the United States August 23, 1859. The improvement consists in means for raising and lowering the cutting apparatus at will.

40. Tyler's mowing machine. This mower was patented in the United States to S. W. Tyler November 13, 1860.

41. Young's self-rake for reaping machines. This device was patented in the United States to McClintock Young September 18, 1860. The improvement consisted in combining with the reel a rake adapted to deliver the gavels sidewardly and rearwardly.

42. Thomas S. Whitenack's self-raking reaper. A United States patent was granted February 5, 1861, to Thomas S. Whitenack for improvement in self-raking reapers. This machine may be considered an improvement on that patented to Dorsey, in that the rakes were adapted to be operated at will.

43. Sieberling's dropper reaping machine. A United States patent was granted to John F. Sieberling December 5, 1865, for improvement in reaping machines. This was designed to deposit the grain in gavels behind the cutting apparatus by dropping the platform. It may be considered to be the perfected type of the Ogle machine of 1822.



F-6. GENERAL VIEW OF SPACE IN REAR OF MAIN TRANSVERSE AISLE, SHOWING IN FOREGROUND THE FARM-MACHINERY RETROSPECTIVE EXHIBIT, LOOKING NORTH.

44. Johnston reel-rake reaper. A United States patent was granted to Samuel Johnston February 7, 1865. Several United States patents were granted to Samuel Johnston, all directed to perfecting a self-raking device, the last one February 7, 1865.

45. McCormick's reaping machine. A United States patent was granted to Cyrus H. McCormick November 5, 1861. The improvement consisted in proportions and arrangements whereby the driver, by shifting his position on the machine, could raise the cutting apparatus.

46. Burdick's self-raking reaper. A United States patent was granted to O. H. Burdick February 27, 1866. The improvement consisted in modifications of the reel rake of the Samuel Johnston type.

47. Kirby's mowing machine. A United States patent was granted to William A. Kirby May 18, 1869. This mower was one of the earliest so arranged that the bar could be raised even to a vertical position without throwing the machine out of gear.

48. Carpenter's automatic binder. This machine was intended to cut the grain and deliver the bound bundles to the ground. It was made in 1866 by Stephen D. Carpenter.

49. Appleby's wide-cut binder. This machine was manufactured by John F. Appleby for the Deering Harvester Company during the year of 1893 and patented in the United States September 15, 1896.

50. Carpenter's grain binder. A United States patent was granted December 31, 1868, to Stephen D. Carpenter for improvement in grain binders. The binding attachment was adjustable in the length of the grain to produce central binding and applied to a Marsh harvester.

51. Gordon's grain binder. A United States patent covering this machine was granted May 12, 1868, to James F. Gordon. Its twisting apparatus and wire-carrying needle were adjustable upon their shafts to permit the grain to be bound centrally.

52. Spaulding's packing and self-sizing binder. This machine was manufactured by George H. Spaulding in 1870 but never patented.

53. Spaulding's self-sizing grain binder. A United States patent was granted May 31, 1870, to George H. Spaulding for improvement in grain binders. This was the first self-sizing grain binder ever patented.

54. Wood & Rosebrook's reaper. This machine was patented to Wood & Rosebrook in the United States January 3, 1871. It was adapted to deliver the gavel at the side of the path of travel by means of a rake carried by an endless chain.

55. Kirby's reaping machine. This model represents the perfected Kirby reaper, covered by several United States patents granted to William A. Kirby. This machine was used both as a hand rake and self-raking reaper.

56. John H. Gordon's packer binder. A United States patent was granted to John H. Gordon August 12, 1872, for improvement in binders.

57. Walter A. Wood Mowing and Reaping Machine Company's self-binder. This machine was invented by Sylvanus D. Locke and covered by many patents taken out by him.

58. Marsh harvester. This model represents the Marsh harvester in its most perfected form as made from 1871 to 1875.

59. Marsh Harvester King. This model represents the Marsh harvester as adapted to cutting a wide swath and with tables upon which three binders might work.

60. Gordon's reciprocating self-binder. A United States patent was granted to James F. Gordon June 30, 1874. This binding attachment was adapted to move toward the grain delivered on the Marsh harvester, take its gavel, and bind while receding with it.

61. Gordon's gavel-forming binder. A United States patent was granted to James F. Gordon covering this machine June 16, 1874.

62. Gorham's grain binder. This machine embodies the inventions of Marquis L. Gorham, patented in the United States February 9, 1875, and October 12, 1880. Several intermediate patents were granted. The purpose of this machine was to automatically make the bundles of uniform size by shifting the conveying devices.

63. Appleby twine binder. This binder was applied by Mr. Appleby to Marsh harvesters in 1875 and is covered by several United States patents, the principal one being that of February 18, 1879.

64. The original knotter invented by J. F. Appleby in 1858. This is the identical knotter first made by him and is the form in practically universal use.

65. Gordon's crane binder. In this machine the binding arm is given an orbital motion so as to step over the gavel, compress it, and bind it while moving outward.

66. This exhibit is an operating knotter as used on the Appleby binders for the harvest of 1878 and subsequently.

67. Holmes' twine binder. This binder attachment was applied to the Marsh harvester as manufactured by Walter A. Wood & Co., and patented in the United States to H. A. & H. W. Holmes December 3, 1878. Its principal characteristics are: Its rotary packer and reciprocating knotter.

68. This model represents the Deering-Marsh harvester with Appleby binder attached, as perfected and put on the market in 1879. This machine was provided with an adjustable reel and Appleby binder.

69. Morrow's corn harvester. A United States patent was granted to R. H. Morrow August 10, 1886, for improvement in corn binders. This machine is adapted to cut the corn and bind it vertically while still standing.

70. Deering corn harvester. This machine is adapted to cut and bind *zea maize* (indian corn). It is covered by patents controlled by the Deering Harvester Company.

71. Osborne corn binder. This machine is adapted to bind the corn after being cut and while still standing. It is covered by United States patents granted to Charles S. Sharp May 28, 1895.

72. Modern mowing machine. This machine embodies the latest improvements in grass mowing machines.

73. Manual delivery reaping machine. This is a mowing machine having attached thereto a grain-receiving platform, from which the gavels are removed by an attendant riding on the machine.

74. Modern self-binding harvester. This machine is adapted to cut the grain, form it into gavels, bind them of uniform size, carry from four to six bundles, as required, and deposit them to the ground preparatory to shocking.

75. Modern self-binding harvester, wide cut. This machine is adapted to cut the grain, form it into gavels, bind them of uniform size, carry from four to six bundles, as required, and deposit them to the ground preparatory to shocking.

76. Reaping machines used by the ancient Gauls. This machine was adapted to comb together the heads only. An attendant walked beside it and raked the heads into the box.

77. Gladstone's reaping machine. This machine was invented by Gladstone, of England, in 1806 and changed and improved in 1808. A horse walks beside the standing grain. The grain is cut and delivered to one side of the path of travel in cutting the next round. The machine is supported on two wheels.

78. Salmon's reaping machine of 1808. This machine was adapted to cut the grain, permit it to accumulate in gavels and the latter be swept from the receiving platform by an automatic rake. A grain divider extends forward to separate the grain being cut from that left standing.

79. Smith's mowing machine. This machine was made by Smith, of Deanston, England, and was adapted to cut grass by means of a rotary disk.

80. Ogle's reaping machine. This machine was adapted to cut the grain, reel it upon the receiving platform, and deposit it rearwardly.

81. Bell's reaping machine as made in 1828.
82. Locke's wire holder and twister. This device is, in fact, the binding head of the Locke machine, and was adapted to hold one end of the wire and carry it around the gavel and twist the two parts of the wire thus brought together and form the band.
83. James F. Gordon's wire holder and twister. This device is adapted to hold one end of the twine while the needle carries the band portion around the gavel, by which both parts are presented to the twister, which unites the ends.
84. Appleby's floating disk knotter. The holder consists of a disk that is adapted to rise and supply the twine required by the knotter in completing the knot.
85. Steward's holder and twister for wire binders. This twisting hook is adapted to retain one end of the wire until the needle of the binder brings the wire around the gavel to a position adjacent to it, when the rotation of the twister unites the two ends.
86. Withington automatic binder as improved by himself, Baker, and Erpelding. The binding attachment, as placed upon the Marsh harvester, was adapted to move toward the receptacle, engage the gavel, and bind the same while moving away. Two spools of wire were used. The act of uniting the ends of the band also united the wires extending from the spools, thus preparing for the operation of binding a new bundle.
87. Osborne combined twine and wire binder. This machine was adapted to use either wire or twine as band material.
88. Modern self-rake reaping machine. This machine embodies the latest improvements in this class of inventions.
89. Modern light mower. Adapted to mountainous countries.
90. Deering wire binder, twister, and cutter. This twister and wire holder was patented in the United States to John F. Steward January 14, 1879.
91. Holmes knotter. This knotter was patented in the United States to H. A. & W. H. Holmes December 3, 1878.
92. Peck's corn binder. A United States patent was granted to A. S. Peck January 5, 1892. This machine was adapted to cut *zea maize* and bind it while still in a standing position.
93. Roller-bearing cage. This antifriction device was patented in the United States of America to J. G. Avery November 28, 1882, and assigned to the Deering Harvester Company. It may be said to be the form most suitable for agricultural machinery.
94. Modern knotter. This may be considered one of the most perfect forms of the Appleby knotting device.
95. Obed Hussey's cutting apparatus, invented in 1847.

The 30 water-color sketches which formed the background of the alcove cases in this exhibit are enumerated herewith as follows:

97. Lake Dwellers' Harvest Scene. Prehistoric.
98. Harvest Scene in Egypt. From ancient inscriptions.
99. Reaping Machine used by the Gauls, A. D. 1.
100. Rice Harvest in North America. Indians gathering wild rice.
101. Modern American Arizona Indians Harvesting Wheat.
102. Modern Harvest Scene in Holland.
103. Modern German Harvest Scene.
104. Early American Harvest Scene.
105. Gladstone's Reaper, 1806.
106. Smith's Mowing Machine, 1811.
107. Salmon's Reaping Machine, 1808.
108. Henry Ogle's Reaping Machine, 1822.
109. Rev. Patrick Bell's Reaping Machine, 1828.

110. Obed Hussey's Mowing Machine, 1833.
111. Old Hussey's Reaping Machine, 1833.
112. Representing Obed Hussey's Test of His Reaping Machine Without the Aid of Horses.
113. Obed Hussey's Early Reaping Machine, 1851.
114. Obed Hussey's Early Reaping Machine, 1854.
115. American Harvest Scene. Obed Hussey's Reaper, 1833.
116. Enoch Ambler's Mowing Machine, 1833.
117. Abram Randall's Reaping Machine, 1833.
118. Jonathan Haines' Header, 1849.
119. Ferdinand Woodward's Reaping Machine, 1843.
120. Modern Manual Delivery Reaper in Operation.
121. Modern Mower on the Road.
122. Modern Self-Binding Harvester on the Road.
123. Deering Harvester Company's Corn Harvester in Operation.
124. D. M. Osborne & Co.'s Corn Harvester in Operation.
125. Deering Harvester Company's Automobile Mowing Machine in operation, 1894.
126. Marsh Binding Harvester in the Field at Shabbona Grove, Ill., in 1858, with the Indian Chief Shabbona in the Foreground.

A very handsome series of 18 framed portraits of noted inventors and manufacturers of harvesting machinery was displayed in the main cases on the aisles. These were numbered from 128 to 145, inclusive, and were as follows:

- The late Hon. Walter A. Wood, New York.
- William Deering, president of the Deering Harvester Company, Chicago, Ill.
- William Wallace Marsh, Sycamore, Ill.
- The late Cyrenus Wheeler, Auburn, N. Y.
- Hon. Charles Wesley Marsh, Dekalb, Ill.
- The late George Esterly, Whitewater, Wis.
- Byron E. Huntley, Batavia, N. Y.
- The late John H. Manny, Rockford, Ill.
- The late David M. Osborne, Auburn, N. Y.
- The late Lewis Miller, Akron, Ohio.
- Governor Asa S. Bushnell, Springfield, Ohio.
- William H. Jones, Chicago, Ill.
- John P. Adriance, Poughkeepsie, N. Y.
- Stephen Bull, Racine, Wis.
- John F. Appleby, Chicago, Ill.
- George H. Spaulding, Chicago, Ill.
- The late Cyrus H. McCormick, Chicago, Ill.
- The late Obed Hussey, Baltimore, Md.

The subjects of the interesting series of photographic enlargements of harvest scenes in many parts of the world covered 56 numbers, from number 147 to 202, inclusive, and related to the machines of various manufacturers. Twenty-nine of these were harvest scenes from negatives taken in many portions of the United States, the subjects including the harvesting (cutting) of hemp and sorghum. Eighteen referred to harvesting in Europe, in the countries of England and Scotland, Sweden, Russia, Germany, Switzerland, Roumania, and Turkey, one



F-15. VIEW OF UNITED STATES AGRICULTURAL ANNEX, LOOKING SOUTH.

of this series being a scene on the farm of Prince Bismarck. Four were taken in Asia, three in Australia and New Zealand, and two in South America, one of which was a harvest festival scene in Buenos Ayres.

The exhibit as a whole formed a unique and impressive showing of what has been accomplished in the century that has passed in the invention and manufacture of a single line of labor-saving devices, which have revolutionized the agriculture of civilized countries, and are revolutionizing the grain culture of the world.

EXHIBITS IN THE AGRICULTURAL ANNEX.

The largest demand for space from any one class of commercial exhibitors came from the manufacturers of agricultural implements, some of whose applications were filed prior to the passage of the law creating the Commission, while nearly all had been filed before the work of exploitation was commenced. As the total of these demands amounted to fully four times the entire original allotment for the two great groups (VII and X), agriculture and food products, the necessity for a larger area of space and for a special building for this class of exhibits was fully appreciated as early as 1898, when the Commissioner-General visited Paris. The further fact that a retrospective exhibit illustrating the evolution of the United States harvester, which was already considered an important feature, and which was to be allotted some 1,200 feet of floor space in the main agricultural building, made it possible to interest the French Exposition authorities in the scheme for a special building for agricultural machinery, and before the Commissioner-General left Paris suitable space had been allotted. This space was eventually covered by the handsome three-story building known as the United States agricultural annex, the floor area of its three stories adding 15,000 square feet of space to the allotment for Groups VII and X.

The agricultural annex was conveniently located at the southwestern end of the main palace of agriculture on one of the main circulation avenues of Champ de Mars, running parallel with avenue Suffren, and was contiguous to the picturesque Swiss village and the big wheel, the great popularity of the former insuring a larger number of visitors to this portion of the Exposition grounds at all times than would otherwise have been the case; the maize kitchen located on the third floor of the annex being another drawing card. From the second floor of the building a short stairway connected with a bridge to the main palace, enabling visitors to reach the agricultural machinery exhibit from the gallery of the main building without going out of doors. The two upper floors of the annex were reached by a central inclosed stairway

which, while it limited the general space area somewhat, gave opportunity to install the exhibits on the four sides of the three exhibition halls, with the advantage of plenty of light and certain wall space for every exhibitor. The only variation from this plan was on the first floor, where the entrance aisles at either end necessitated a central space just in the rear of the stairway wall.

In the chapter on installation I have referred to the effort that was made to secure uniformity in the general scheme of arrangement of the exhibits and in those decorative features which would give character to the exhibit as a whole. It was particularly insisted upon that all the platforms should be 8 inches high, and that no railings should be used other than plush-covered rope depending from wooden posts of a simple design, all woodwork showing a dull black finish. The walls above the 6-foot line were to be kept clear of exhibits, and in the spaces thus left between the windows the signs of the different exhibitors, set in the colors, were displayed against a dull buff background, the wall below the 6-foot line being painted a dark metal green.

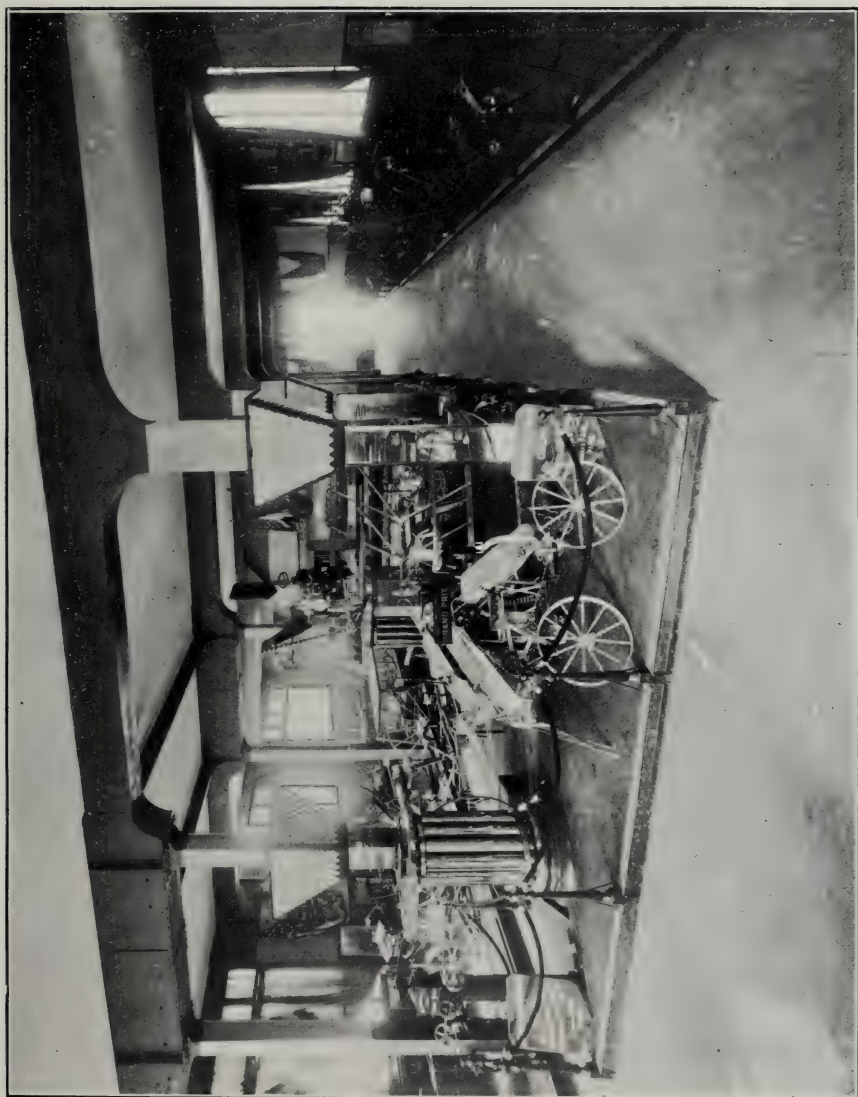
Moreover, the exhibitors were given a hint regarding the color scheme to be employed months before the Exposition was opened, with the result that crude colors in the finish of the machines were almost wholly avoided, while in a majority of the exhibits the coloration employed was delicate and artistic in the extreme. As a grand result, the almost neutral coloration scheme of the walls of this building, and especially the simple character of the railings, posts, and woodwork, directed the eyes of the visitor to the exhibit itself—the machines as presented to view—so that as a whole it may be said without exaggeration or fine writing that this was one of the most artistically installed and superbly attractive exhibits of agricultural machinery ever brought together at an exposition—the direct result of a free, but judicious, use of money, of the display of rare good taste; and, finally, of a willingness to be guided by the carefully devised rules and regulations.

There were twenty-five exhibit spaces on the three floors, ranging in area from 120 to 600 square feet, 450 and 500 being the average in a majority of instances. Nor were these arbitrary allotments, for after laying out the main circulation aisles the floor area was found to be subdivided into certain plots, which either were of proper size for the exhibitor or of sufficient area to be divided between two exhibitors.

According to this scheme of subdivision there were seven exhibits on the ground floor, ten on the second floor, and seven on the third floor, not considering the corn kitchen or the Heinz demonstration counter in the same space. Following the number of spaces as laid down on the plans of the three floors of the agricultural annex, which are appended, the exhibits were as follows:

FIRST FLOOR.

1. *The Plano Company, Chicago.*—As the visitor enters the south-east doorway of the annex the Plano exhibit occupied the entire end



F-16. VIEW ON GROUND FLOOR OF AGRICULTURAL ANNEX, LOOKING NORTHWEST, CENTRAL SECTION.

of the building to the left. The exhibit comprised nine numbers, which were catalogued¹ as follows:

(1) Automatic grain binder, used to cut standing grain from the stubble, bind it in bundles, and, with the aid of a bundle carrier, deposit it in bunches of several bundles, ready for shocking. Automatic has relation to its binding whenever a bundle is accumulated without the aid of operator.

(2) Mowing machine (for two horses), used for cutting grass from the stubble and having it in a thin sheet on the ground for curing, using the straight reciprocating knife running between stationary guards fixed on the cutter bar.

(3) Reaping attachment for mowing machine—an attachment for retaining the grain on the mowing machine and dropping it in bunches to be bound by hand. Combines the mower and reaper for small farmers at a cost very little above the mowing machine.

(4) Mowing machine (1-horse), cutting grass from stubble and leaving it in a thin sheet for curing, using the straight reciprocating knife running between stationary guards fixed in the cutter bar.

(5) Reaping attachment for mowing machine (1-horse)—an attachment for mowing machines for retaining the grain and dropping it off in bundles to be bound by hand. Combines the mower and reaper for small farmers at a cost very little above the mowing machine.

(6) Self-rake reaper (2-horse), for cutting grain from the stubble and automatically depositing it in gavels for binding by hand.

(7) Self-dump rake, for raking hay into winrows for bunching after it is cured. It is called self-dump because when the operator trips the mechanism the forward movement of the horse dumps the rake and leaves the hay in a winrow and returns the rake to position to immediately gather the hay again for another winrow.

(8) Hand-dump rake, for raking hay into winrows after it is cured. It is called hand dump because the operator dumps it by hand into winrows and brings it again to position for gathering another winrow.

(9) Sickie grinder, for grinding the sections of a harvester, reaper, or mower knife and by a change of emery stones from a bevel to a flat face, providing a general utility grinder for grinding tools.

These machines were artistically finished in natural wood, and in white and gold paint, with nicked metal parts, floral emblems being freely used in the decorations. The machines were advantageously placed upon the small space available, and the exhibit was attractive in appearance.

2. *Aultman, Miller & Co., Akron, Ohio.*—This exhibit occupied one-half of the space along the west side of the building, which owing to its width of only 13 feet gave room for only three machines.

(1) Buckeye Mowing Machine: The controlling merits of this machine are high wheels, wide apart, light tubular frame, long shafting, adjustable bearings and brass bushings, absence of toggle or ball joints, double-hooked pitman with positive parallel bearings insuring a shear cut, direct and very light drift, highly finished cutting parts of best steel, graceful appearance, noiseless operation, unapproached durability; foot and hand lever raises bar instantly to outer end. For transportation the bar is folded over onto the tongue.

(2) Buckeye Binder: Mounted on large wide wheel which goes on and off like a wagon wheel, dispenses with complex framework, wheel well to the front insuring

¹ The descriptions of these machines and of those that follow have been prepared from catalogue sheets or data supplied by the exhibitors. Modifications and reductions have been made where the descriptions have been considered too full for the purpose of this report.

perfect balance and passage over hollows without plowing into ground, raised and lowered with most ease, open end elevator, elevator closed for short grain, cuts to the ground, very simple knotter, adjustable, and can be kept good as new. One lever puts the reel high or low, forward or back, as the driver may wish. Driver also has at his hand levers to adjust place of band on sheaves, to control gear, hinge board, butter, bundle carrier, wind board, and height of cutting. Machine only stops to oil or get twine.

(3) Buckeye Reaper: Can be drawn by two horses or oxen. Its width of cut is 5 feet. It will cut any height of stubble, make any sized sheaf automatically, can be raised or lowered at either or both ends, and can be folded up to pass narrow gates and travel of the road. For lodged crops it has no superior.

Small as was the space the most was made of it, for in addition to the handsomely and artistically finished machines, the space was furnished and finished with a desk supporting a bust of President McKinley, with pictures, a frame of medals, and with draperies, the general effect of the whole being most pleasing.

3. *Adriance, Platt & Co., Poughkeepsie, N. Y.*—This concern displayed examples of their mowing, reaping, and binding machines, together with pictures, machine parts in a small panel forming the letters "A., P. & Co.," framed panels of medals, models, etc. The exhibit occupied one-half of the western wall space just to the right of the main stairway and was well installed. The exhibit as catalogued was as follows:

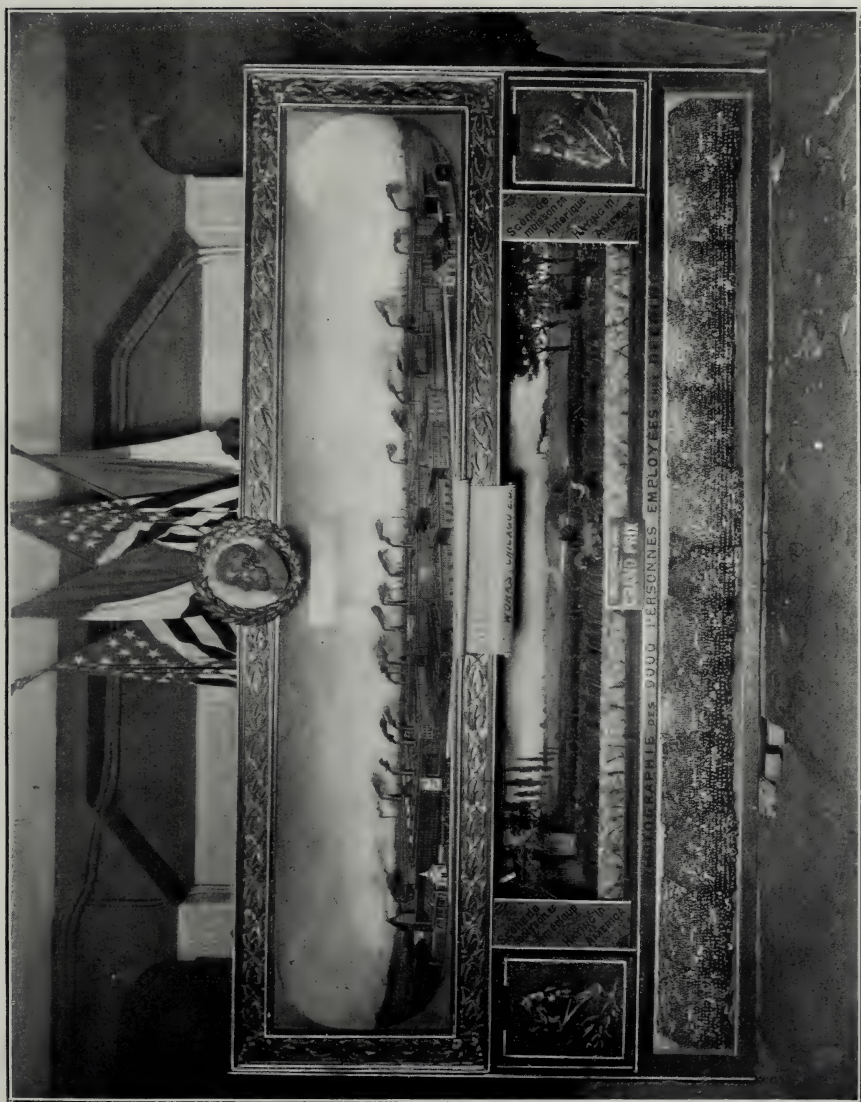
(1) The Adriance binder: This machine embodies, common to all harvesters, only the reel and platform carrier. All other features are unique. A revolving elevator near the inner cutters lifts the cut grain about 15 inches. The binder, in tying, moves it to a position nearer the driving wheel, whence it is discharged directly to the rear, having been carried about half the usual distance. This compact arrangement permits simplicity of and a lesser number of parts and slower movement of working parts, resulting in economy of weight and power, and the lightest draft.

(2) The Adriance Buckeye mower: The first, fully successful, has been typical of the now universal construction. Driving wheels free from gearing and double-hinged couplings to the cutter bar were introduced in this mower in 1857; the single-piece tubular frame in 1871. Simplicity and utility are characteristic of all features of the No. 8. Gearing, only three pieces; foot lift forward acting; cutting bar folds over the pole; automatic spring draft renders work more uniform and easier for team.

(3) Adriance Buckeye binder: Is of the type carrying the grain over the driving wheel, discharging at the side. The elevator shows advantages in using a large roller at the throat and a clearing roller at the top and the minimum of elevation. Self-aligning shafts secure economic use of power. The binder driving shaft operates the binding parts by novel, simple means, without chain or gearing. The knotter applies tried devices to utmost advantage, insuring a perfect knot with economy of twine.

(4) The Adriance reaper: A machine of exceptional capacity and construction. Has a driving wheel free from gearing; a rigid frame providing for full support of shafting and gearing; a high rake set well away from the grain, with long rake arms, securing the best reeling and delivery action; variable speed of rake and changeable automatic action for sizing the gavels, with provision for independent operation by the foot of the driver. The reaper folds compactly and easily for transporting or storage.

(5) The Adriance Triumph reaper: The frame carries, of the gearing, only that operating the scythe, the rake being independently driven direct from the axle of



F-27. PANORAMIC FARM AND FACTORY SCENE, BY DEERING HARVESTER COMPANY.

the main wheel. This plan permits a very light frame construction. The rake cam is large, with easy grades conducive to lessening the power required. The rake head is broad and light, suitable for reeling and delivering neatly. Size of gavels is regulated automatically or may be controlled by the foot of the driver. Machine folds compactly for transporting or storage.

(6) Adriance Buckeye mower No. 7, chain drive: Has large driving wheels, wide apart. Power is transmitted from a sprocket wheel, on their axle, to the pitman crank by a chain belt and one set of gears. The chain is provided with an automatic tension to prevent lost motion. The crank shaft is level with the ground, securing always direct line of the long pitman and the scythe. The long cutter-bar connections permit the spring-balanced cutter bar to follow closely the ground surface. In all features except gearing the No. 8 and No. 7 are alike.

(7) Adriance Buckeye reaper, manual delivery: A reaping device for attachment to our mowers consists of a light platform of rearwardly projecting slats, hinged to the cutter bar and controlled in position by a lever under the operator's foot. A carrying wheel and grain divider is provided at the outer end of the cutter bar. The operator holds the platform at an angle upward from the cutters and uses a rake to guide the grain onto it. The gavel is discharged by dropping the back of the platform onto the stubble.

(8) Self-rake for reaper: This rake can be set by a convenient lever to automatically deliver the gavel by either every rake, or every second, third, fourth, or fifth rake. At the same time the driver by his foot can control and vary the operation of any rake head, using it either for reeling or raking, and delivering the gavels at will. The moment the operator ceases to control it, the rake resumes its automatic action, beginning again its count from the last head operated as a rake.

(9) Adriance binding attachment: Is peculiar in that after the needle has grasped the grain the binder post oscillates from its base, and the grain to be bound is thoroughly separated from the incoming grain, obviating choking, and securing a clean discharge of the bound bundle, which is delivered on its butts at the rear. The knoter makes no waste end of twine and requires the minimum length in the knot, because all turns are made by or about a single cord instead of, as usual, about a double cord.

(10) Adriance buckeye spring-tooth harrow: Has carrying wheels revolving on removable bushings; levers which set and hold the teeth for any desired depth of penetration of the soil, and which, when moved for any purpose and then returned, are sure to lock at the same point from which they were moved. This secures the same penetration for all teeth without the necessity of stoppage to adjust them on the different sections. The harrow, if desired, is provided with a riding seat for the operator.

4. *The McCormick Harvesting Machine Company, Chicago.*—This exhibit occupied the entire end of the building, to the right of the northeast entrance, and one of the largest spaces allotted. While only four full-size machines were shown, there were many other interesting exhibits of models, etc., in plate-glass table cases or arranged upon the posts which came into the space, or upon the walls. A prominent object was a large frame, handsomely draped, inclosing facsimiles of the medals received by this house at former expositions or elsewhere. The machines, of excellent material and workmanship, were in finish and decoration, among the handsomest in the building, combining exquisite taste with artistic excellence. The wall exhibit was largely a series of decorative panels illustrating historic machines of the

McCormick Company. The following is the catalogue list recorded in my department:

(1) Automatic self-binding harvester, with bundle carrier and transport—right-hand cut: This machine is carefully designed and constructed of special forms of steel, malleable and cast iron, whereby it has the maximum of strength with minimum weight. It has a large capacity for handling any crop, however heavy, lodged, and tangled it may be. Its draft is very light, owing to its rigid construction and to the fitting of its principal bearings with antifriction rollers. The range of adjustment on the reel, binding attachment, tilt, flag, and of the whole machine on the wheels is large, insuring a capacity to harvest any crop, however much its height and condition may vary. Its knotting device for uniting the ends of the band is very simple and reliable. Its various devices are patented and are found only on this machine.

(2) McCormick Folding Daisy reaper: A very light, compact machine, with great strength and capacity to handle the most difficult crops. It is fitted with roller bearings. The seat is supported on the outer side of the main wheel, and the gearing and rake standard are positioned just inside the wheel, whereby traction is obtained to do heavy cutting and raking. The rake standard is very high and the machine has a large range of adjustment. The rakes, therefore, pass over tall grain and reel it on to the platform without tangling it, and when a gavel has accumulated, sweeps it in a nicely formed bundle on the ground. Its rakes are quickly controlled to sweep the platform at every second, third, fourth, fifth, or any rake arm that the operator may desire. The strong hickory pitman drives the knives with powerful strokes and the well-fitting guards make a perfect shear cut.

(4) McCormick New Four mower: The draft rod which connects the shifting double-trees with the rocking shoe, thus distributing the power of the team between the frame and the cutting apparatus, is patented. It draws the cutting apparatus lightly over the ground. The crank-shaft extension is short, thus bringing the finger bar near the main axle, which prevents the tongue from jerking back and forth as the bar encounters obstacles on rough ground.

(5) McCormick's automatic sickle grinder: Clamp the knife in the holder, turn the crank, and the knife will be ground without other attention. The long crank gives leverage, making the grinding easy. A full-sized reproduction of this machine was shown in the McCormick pavilion at Parc Vincennes.

(5) Model of reaping machine of 1831: The original of this reaper was invented and built by Cyrus H. McCormick, on his father's plantation, at Steele's Tavern, Va., and cut wheat and oats in the harvest of 1831.

(6) McCormick Steel Self-Binding Harvester of 1892.

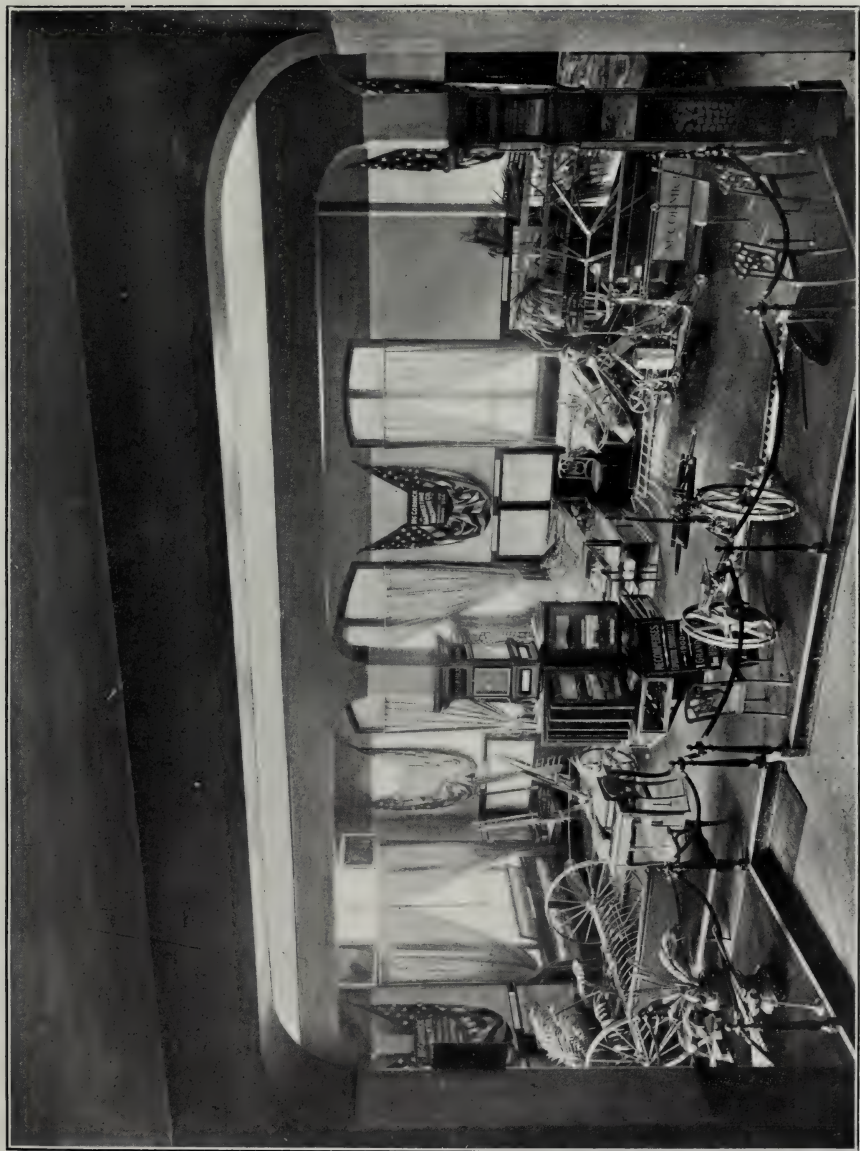
(7) Model, illustrating the use of the McCormick transport.

(8) Model of the McCormick Big Four mower: This mower is built on the same general lines of the medium-size machine. It is intended, however, to cut a wider swath, and has a wider and heavier frame and higher wheels to give traction and balance a long bar.

(9) Model of the McCormick one-horse mower.

(10) McCormick manual delivery reaper: The foundation of this reaper is the McCormick mower.

(11) Model of the McCormick corn binder: This machine cuts the stalks, moves them on end to a receptacle, where they are compacted into a bundle and encircled with a band, bound and discharged into a carrier, which holds four or five bundles, and transported to a row that is formed for convenience in shocking. The machine is very compact and formed of square tubes to withstand the heavy strains. The machine is balanced over the main wheel to give traction. The gathering devices will pick up any crop, whatever its condition. The knife is a combined reciprocating and stationary one, the stationary knives severing the stalks by the forward advance of the machine and the reciprocating knife cutting any limber trash and weeds. The



F-17. VIEW ON GROUND FLOOR OF AGRICULTURAL ANNEX. END SECTION, NORTHWEST.

binding attachment is remarkably adapted to its work, and its knot-tying mechanism is very simple; its combined compressing and trip spring cause a quick action of the attachment, absolutely essential to the binding of corn (maize).

(12) Model of the McCormick header harvester: It is very simple. The wide framing of the machine surrounds the large drive wheel, which is placed on the outer edge of the machine. The elevator is supported from this side, and traction is assured to give motion to the long knife and endless apron. The tongue is attached at the center of resistance, which is at a point within the swath being cut. The platform is counterbalanced by strong springs, whereby the driver easily adjusts it for grain of varying lengths as the machine is at work. The whole machine is constructed of steel, malleable and cast iron, and its construction is thought to be an example of the best in the art of harvester building. Its bearings are fitted with roller bearings; its aprons are of heavy ducking and fitted with wide straps at both edges and in the center; its platform is of sheet steel, its drive chain is pinned with teeth; its elevators are steel, and braced to withstand hard knocks from the wagons; its gearing is reduced to a minimum, and its balance is so perfect that it requires little attention from the driver to keep it cutting a full swath.

(13) Model of the McCormick hand-dump steel rake: This tool is built in five widths, and has interchangeable pole and shaft. Its teeth can be spaced close together for fine hay and wider apart for coarse hay and fodder by changing the teeth-holding castings. The material of its axle and frame is so formed as to give the greatest strength, and wherever possible the frame is riveted together. Broad hinges give a large wearing surface, and are so positioned that the pull on the rake and the weight of the driver aid in dumping, thus insuring ease of operation. The wheels are steel, with oval, staggered spokes, hot upset in the hub, fitted with removable boxes, and the tire is 2 inches wide, channeled to increase its strength. This tool is very simple and has great strength and durability.

(14) Model of the McCormick self-dump steel rake: The dumping device is extremely simple, without springs, and acts very positively. Ratchets upon both wheels assist in the dumping operation. These rakes are built in five widths and have interchangeable pole and shafts. The teeth can be spaced close together for fine hay or wider apart for coarse hay by changing the teeth-holding castings. The frame is formed of angle steel, to give the greatest strength for the least weight of metal, and is riveted together wherever possible. The hinges are wide, insuring a large wearing surface. The wheels are steel, with a 2-inch channeled tire rim, oval, staggered spokes, hot upset in the hub, and fitted with removable boxes. These rakes have great capacity, strength, and durability. They have the strength to stand the heaviest work, not only in raking but in bunching the windrows.

(15) McCormick simple knotter: The knot is tied on this device with only one revolution of the knotting hook and a half revolution of the holder disc.

(16) McCormick roller bearings: The saving of friction by use of roller and ball bearings has been in use for many years. The McCormick Company began using antifriction bearings in 1886 and has gradually incorporated them in its harvesting machines until now more than 1,500,000 such bearings are yearly used in its immense output. Its works are equipped with automatic machinery that cuts the wire into lengths and rounds the end of each roller, after which these rolls are placed in the cages, the ends of which are tied together by riveted stay rods. The rollers reduce friction on many of the bearings on a harvesting machine, but are considered by many persons to be impractical and to increase friction when used on other bearings.

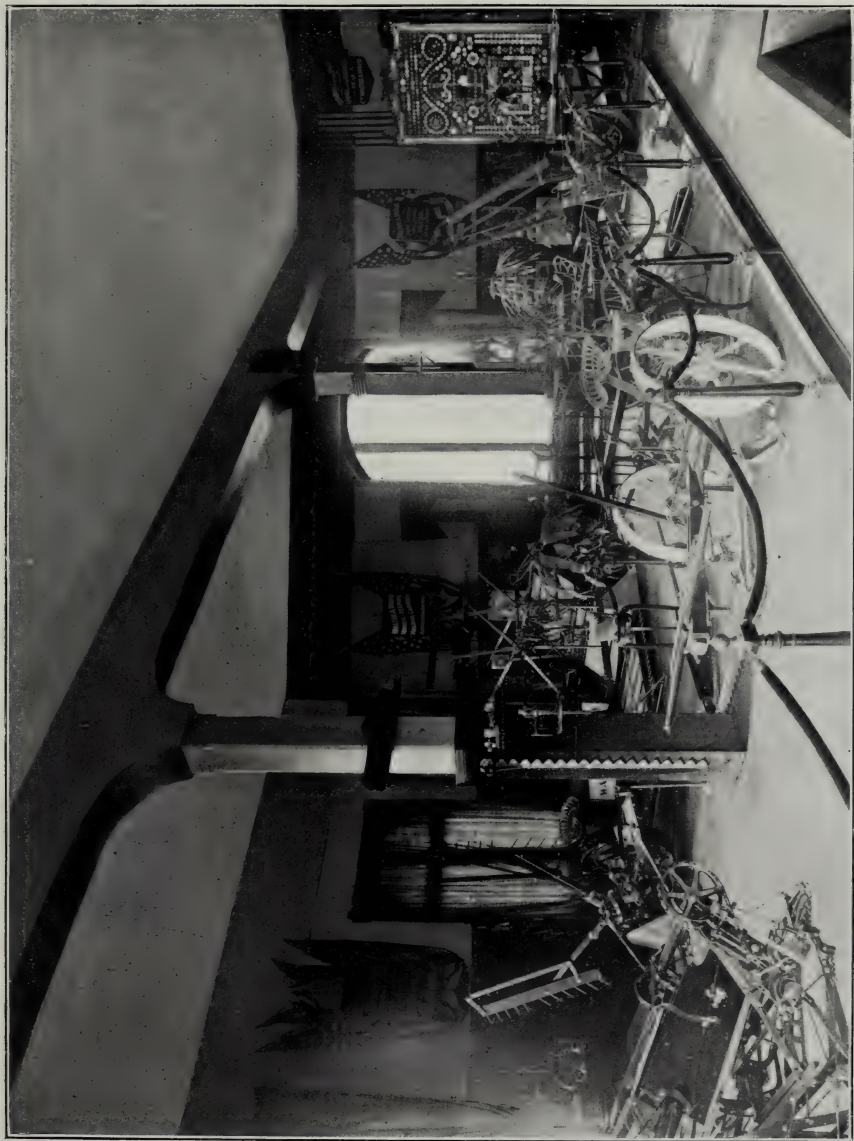
(17) The McCormick bundle carrier: This device will carry many bundles. It has great strength. A strong spring aids the driver in its operation and also brings it back to receiving position after it has folded to the side of the machine to pass obstruction. It discharges the bundles all at once and so gently as not to shell any grain. The windrows are in line and the driver can work the carrier day after day without fatigue.

5. *The Deering Harvester Company, Chicago.*—This exhibit occupied a central space just in the rear of the main stairway, and was therefore bounded on three sides by aisles. The full-sized machines shown upon the space were models of beauty, artistic decoration, and fine workmanship, and there were other most interesting features, the exhibit in its entirety being unique in design and most striking in its installation. In a word, the keynote of the exhibit was motion. Against the stairway wall was placed, in a recess, a model of an American farm scene in miniature, in which real objects were so artistically combined with the painted background that it was well-nigh impossible to escape the illusion that one was looking at an actual American farm. Around the meadow, which filled the foreground, with its tall grass rising above the stone wall, traveled a diminutive mower with man and team, the grass falling in swaths as it passed and growing up again almost imperceptibly before the little mower made its next round. Above this was placed a model in perspective, 18 feet long, of the extensive Deering works, with large portrait medallions, flag decorations, etc., above and at the sides. In this motion was obtained by trains of cars, moving steamboats on the river, and other similar devices. Upon the top of a raised structure, finished in the form of a sofa and filling the center of the space, appeared a Deering automobile mower, not itself in motion, but revolving upon a table. The four pillars of the building which came within this space were also alive with motion. To typify the fact that roller and ball bearings are used by the Deering Company as antifriction devices for agricultural machinery, immense polished roller and ball bearings revolved around these posts, carrying at their tops working models of the machines (themselves actually in motion), which space did not permit to be exhibited in full size. Above this were highly polished knives slowly vibrating in rhythmic motion. Decorations of polished steel and beautifully wrought scroll work formed by parts of machines completed the ornamentation.

The following descriptions of contemporaneous Deering harvesting machines exhibited in the Agricultural Annex, Champ de Mars, have been compiled from data supplied by the exhibitor:

(1) The Deering Ideal harvester and binder shows the type of harvesting machine that now cuts nearly all the grain of the civilized world. The Marsh harvester was first exhibited at a universal exposition in Vienna in 1873. Then two men rode on it and bound the grain as it was brought to them. Though much used in America, it there received but little attention. From it, however, actually grew the modern method of harvesting grain, the self-binding attachment later logically taking the place of the two hand binders. Such was the true merit of the Marsh harvester of 1858 that at the Paris Exposition of 1900 13 exhibitors vied with each other in showing the excellencies of their particular production of machines of this type.

No minute description of the principles upon which this machine is founded is necessary. The foundation principles of the original machine have never been departed from in bringing it to the perfection shown, but its sinews have become of



F-18. VIEW ON SECOND FLOOR, AGRICULTURAL ANNEX, LOOKING NORTH FROM MAIN STAIRWAY.

steel, its details of construction have received finishing touches, and with the close of the century its every element is seen in all binding harvesters in existence. These foundation principles which constituted the binding harvester adapted the machine to receive the automatic twine-binding attachment now put upon the market by the various manufacturers of harvesting machines.

John F. Appleby, in 1858, invented the automatic twine-binding attachment shown on the Deering Ideal harvester and binder. In 1878 this attachment was put upon the market by the predecessors of the Deering Harvester Company, which has resulted in the modern complete self-binder.

The main features of the Deering automatic binding harvester consist in its simple knotting device, compact arrangement of its gearing, perfect tripping mechanism, antifriction bearings, and its complete bundle-discharging mechanism. The butts of the grain are handled by an aggressive adjuster, consisting of two boards moving alternately, in place of one of single width. This is an up-to-date improvement. The third discharge arm is so shaped as to permit any straws that would otherwise hang to be drawn off by the forward advance of the machine. In order to prevent the accumulating bundle from shifting forward out of position when the machine is tilted, an extension to the adjusting device is provided, against which the butt of the bundle is formed. The binding attachment is supported upon cranes, which improvement, found only upon Deering machines, permits easy forward and rearward adjustment. The folding bundle carrier is supported upon the binding attachment and moves with it. Its fingers swing downwardly and rearwardly, and lay the bundle gently upon the ground. They move to the side of the machine at will, and thus are out of the way of the operator when oiling the machine or in threading it. This carrier is so esteemed as to have been adopted by various other exhibitors. Throughout the machine friction is reduced to the minimum by the placement of roller bearings at every point where in the least beneficial. An adjustable reel, its supporting wheels with flanged rim, its hot-riveted frame, its perfect rolling axle, raising device, invented and patented by the Deering Company, and the perfections added to the machine from year to year, during the forty-two years of its existence, are features of merit in this machine.

(2) Deering Ideal mowing machine: The frame of this machine is composed of one piece only. All its bearings are formed in that one piece. One pair of spur gears and one pair of bevel gears are sufficient to transmit power from the main supporting wheels and give ample speed to the cutting apparatus. No clutch is required, as the working parts are thrown out of operation by moving the gears out of mesh, which is accomplished instantly by the foot without stopping the machine. Antifriction roller bearings are used at all points except where the shock of the pitman would tend to destroy them, in which places ample renewable bushings are provided. All gearing is perfectly shielded. Its coupling frame consists of a strong steel bar, without welds, so shaped as to conform to all its requirements. Upon this the cutting apparatus is supported by a swivel piece, which automatically permits a rocking movement of the cutting apparatus as it passes over the ground, and also permits of the cutting apparatus being rocked by means of the tilting lever at will.

(3) Deering Ideal reaper: This machine is light in weight, simple in construction, and perfect in its movements. Ball and roller bearings and antifriction devices reduce friction to the minimum. Ample adjustments for regulating the height of cut are provided. The tilting mechanism is simple. The platform can be folded for traveling over the road. Its raking device is so perfectly controllable as to fulfill all the requirements.

(4) The Deering One Horse Ideal reaper differs only in size from the machine just mentioned.

(5) The Deering Steel Horse hay rake was shown in a beautiful model upon one of the revolving tables.

(6) Deering Automobile mowing machine: This machine, as stated by the exhibitor, is the result of six years' labor and embodies inventions covered by various letters patent of the United States. It may be considered to be an agricultural automobile, capable of hauling loads about a farm, operating a mowing or harvesting machine, or, in fact, any machine that has heretofore been drawn by horses. In the place allotted for the draft tongue in ordinary mowers, a strong tube is placed, that serves as a muffler for the two cylinders of the engine and as a reservoir for the fuel oil. The cylinders are placed tandem and connected to the gearing of the machine in such a manner that by the rocking movement of a shaft the direction of travel is subject to the will of the attendant, and by a rocking movement of the same shaft as a lever the machine is moved forward or back as required. The perfect lifting lever and poising spring of the Deering mowing machine are applied. The gearing mechanism may be so shifted, by a pedal adjacent to the place provided for the driver's feet, that motion imparted from the engine may be either to the driving wheels or the cutting apparatus, or both at the same time.

(7) Model of the Deering Harvester Works: This model, 18 feet long and 3 feet in depth, is beautifully wrought of sheet metal. Electric lights shine from its many thousand windows; the red glare of the foundry and the smoke pouring from the chimneys simulate the industry within.

(8) Deering photograph of its workmen: This picture, 18 feet long, is worthy of mention as an accomplishment of the photographer, as well as showing the immensity of the great manufacturing establishment that gives employment to so many thousands.

(9) Deering roller bearings: These gigantic models of one of the greatest antifriction inventions, now almost universally adopted by manufacturers of harvesting machines, form a striking advertisement. Each supports a table 5 feet high, upon which are working models. These exhibits, of size and strength sufficient for the propeller shaft of an ocean steamer, serve as an object-lesson in the use of such devices for reducing friction to the minimum.

(10) Model of Deering wide-cut harvester and binder: This represents the Deering Ideal binder so modified as to cut a swath of great width. The tongue is supported upon a wheel which resists the tendency of side draft incident to machines of such width.

(11) Deering Ideal knife grinder: This machine, simple and convenient, is adapted to all kinds of grinding, particularly to the cutting devices of harvesting machinery.

(12) The Deering Ideal corn binder: This machine is shown in a beautiful model upon one of the revolving tables of the general exhibit. A complete description will be found in that part of the report referring to space 24.

The arrangement of the Deering exhibit well fitted it for its place at the middle of the building because of the fact that, with the automobile mower placed as it was, upon the high revolving pedestal, it formed a fitting nucleus around which other exhibits were grouped.

6. *Deere & Co., Moline, Ill.*—This exhibit occupied one-half of the east wall space near the southeast entrance. It comprised riding, walking, disk, and sulky plows, which were tastefully arranged to fill the long, narrow space allotted.

The exhibitor furnished no description of the machine in this exhibit.

7. *Syracuse Chilled Plow Company, Syracuse, N. Y.*—This exhibit occupied the corresponding space to the above, near the northeast entrance.

No descriptions of the exhibits were received.

THE SECOND FLOOR.

The second floor was laid out with a central aisle running from the rear stairway wall south to the end of the building, the exhibits arranged on either side, while in the opposite end of the building the exhibit space filled the entire area, with small spaces at each side of the main stairway structure and of the stairs leading to the bridge.

8. *The Johnson Harvester Company, Batavia, N. Y.*—Their exhibit occupied one of the larger spaces on this floor, being one-half of the area west of the rear central aisle. The exhibit was as follows:

(1) Bonnie binder, right-hand cut, with transporting truck and sheaf carrier: A complete machine for cutting and binding grain into sheaves. Chief novelty consists in compactness of design, low elevation of grain, light weight and draft, levers for adjusting the various working parts convenient to driver's right hand, seat situated so driver can step to the ground. A machine with all the latest arrangements and appliances—roller bearings, self-aligning bearings, large lower roller for upper elevator, open-end elevator, seventh roller between deck and elevator canvas.

(2) Sheaf-carrier attachment: Carrier with folding fingers, by which the desired number of bundles may be accumulated and deposited upon the ground at the will of the operator.

(3) Transporting truck: Strong simple axle and wheels, by which binder may be quickly mounted for transportation upon the highway or in transit to the field.

(4) Continental grain binder, left-hand cut: A modern harvester and binder of standard weight and large capacity. Roller bearings and many details of construction similar to the Bonnie binder just described.

(5) No. 3 chain-drive combined reaping and mowing machine: Designed for farms where the use of a combined machine is economical and desirable. The mower extremely simple, strong, and durable, with steel frame, power conveyed by detachable link chain, rear cut finger bar to which platform of reaper may be readily attached. A reaper attachment which may be quickly attached to mower, and which has four rakes automatically controlled by the most modern appliances.

(6) No. 9 chain-drive mowing machine: A mower representing the latest state of the art, with ample strength, cutting power, and capacity, but light running and of easy draft. Roller bearings; power transmitted by detachable link chain belt, low-cutting finger bar, thoroughly and easily controlled and adjusted.

(7) Dropper attachment for No. 9 mower: Light and simple arrangement, easily attached, whereby standing grain may be cut and by hand of an operator raked off into gavels.

(8) Mayflower chain-drive mowing machine: Similar in construction to the No. 9 mower above described, but lesser in size and capacity, and a novelty among one-horse machines in that it has all the conveniences for adjustment and handling of machine found in standard size mowers.

(9) Continental reaping machine: A light reaper of latest construction, with simple range of adjustment in raising and lowering and tilting the machine, automatic arrangement controlling raking off of gavels; roller bearings. A complete and popular machine.

(10) Globe horse hay rake: Constructed entirely of steel and iron, excepting the shafts. Light, strong, and easily operated.

(11) Hay tedder: A strong machine, well designed for its work, having six 3-tined forks with spring trips.

9. *D. M. Osborne & Co., Auburn, N. Y.*—This concern occupied another of the larger spaces in the annex, which was located on the

central section of the line of space abutting the west wall. The catalogue sheets submitted refer to fourteen implements "complete in size and detail as operated in the field," a very large exhibit admirably arranged on limited space. In the coloration of these machines the color scheme which is employed upon all machines sold by this company is adhered to, blue and yellow predominating. Very little was done on the space by way of decoration, and it was therefore a solid exhibit of machines. The display was as follows:

(1) The Osborne Columbia C mower, 4½-foot: For cutting grass and hay. Made in sizes to cut 4½, 5, and 6 foot swaths. One-piece main frame, flexible cutter bar (cuts even stubble), convenient foot lift, inclosed gears, light draft, cold-rolled steel shafting running in roller bearings.

(2) The Osborne Columbia B mower, 3½-foot: For one horse. Especially adapted for use on small farms.

(3) The Osborne Columbia reaper: For cutting grain and depositing in bundles ready for binding. The rakes are controlled by the operator and can be set to work either automatically or at the will of the operator by means of convenient foot trip, depositing a bundle of any desired size. Axles are made of solid cold-rolled steel; fitted with roller bearings.

(4) The Osborne Columbia harvester and binder, L. H., 5-foot: For cutting and binding grain. Made to cut either right or left hand, 5, 6, or 7 feet in width. Straight-drive pitman, self-aligning boxes, low elevation, simple knotter, long shift on binder attachment for short or tall grain, cold-rolled steel shafting, roller bearers.

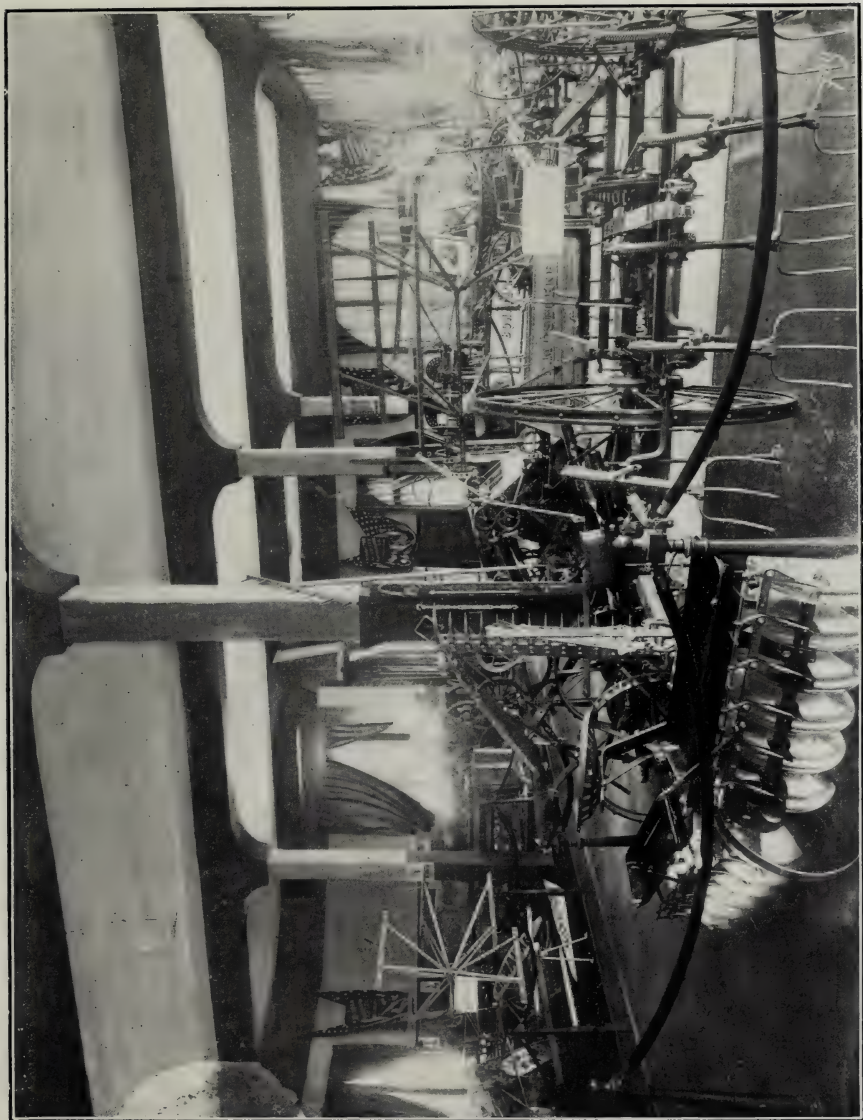
(5) The Osborne Columbia manual-delivery reaping attachment: For use with mowers. Made in sizes to fit all Osborne Columbia mowers. Is used by attaching to mowers, converting the same into a machine for cutting grain, the delivery of the grain in bundles being made by an additional operator, instead of automatically as by the Columbia reaper. It is especially adapted for use on small farms.

(6) The Osborne Columbia all-steel tedder, 6-fork: For stirring or tossing hay, leaving it open and loose so as to permit free circulation of air, facilitating the drying and curing of the same uniformly. Indispensable in heavy crops and rainy sections. Solid crank shafts, making it impossible for forks to get out of adjustment. All steel throughout and fitted with roller bearings. Also made with 8 forks for use with two horses.

(7) Osborne Columbia all-steel self-dump hayrake, 8-foot, 30 teeth: For raking or gathering hay into windrows. Rake can be tripped or dumped at will by means of a convenient foot trip. Interchangeable wheels and dump rods, giving double the service of ordinary rakes. Provided with floating teeth, preventing the hay from rolling or twisting in the wheels. Made of steel throughout and fitted with roller bearings.

(8) Osborne Rival disk harrow, 12 disks, 16 inches diameter: For cutting and pulverizing the soil preparatory to seeding. More generally used in green sward or rough heavy ground. Provided with steel weight boxes for increasing the depth of cut and spring tooth for cutting center ridge, separate scraper for each disk. Fitted with adjusting levers to set the gangs at any desired angle. Main frame forged in one piece. Made in 12, 14, and 16 disks, 16, 18, and 20 inches in diameter.

(9) Osborne Columbia spring-tooth harrow, 17 teeth: For harrowing or cutting all kinds of soil that has previously been plowed, loosening or pulverizing the same preparatory to seeding. Frames are made of single pieces of angle-bar steel. Teeth are made of high carbon steel and fitted with reversible points giving twice the wear of the ordinary plain tooth. Made entirely of steel and malleable iron with 15, 17, and 23 teeth.



F-19. VIEW ON SECOND FLOOR, AGRICULTURAL ANNEX, CENTRAL SECTION, LOOKING SOUTH.

(10) Osborne Columbia spring-tooth harrow, 9 teeth, with handles: Left-hand section of the 17-tooth harrow described above, fitted with handles, for use with one horse. Especially adapted for work in vineyards.

(11) Osborne Columbia sulky spring-tooth harrow, 17 teeth: The special feature of this harrow is the sulky or riding attachment which is fastened only to the front of the harrow and carries the full weight of the driver. The harrow is flexible and has no side motion. The levers for adjusting the harrow for deep or shallow cultivation are within easy reach of the driver.

(12) Osborne Columbia combination harrow, 16 teeth: Contains all the features of our regular spring-tooth harrow as described in exhibit No. 9, above, and has in addition a row of slanting steel teeth secured to the rear beam by malleable clips, producing a double result from a single operation, opening and pulverizing the soil, also leveling and smoothing the same, leaving the ground in proper condition for seeding or covering seed already sown.

(13) Osborne Columbia peg-tooth harrow, 60 teeth: For pulverizing the soil preparatory to seeding or to cover seed already sown. Sections are independent of each other, cultivating ridge or hollow. Harrows are furnished with from one to four sections as ordered, and each section can be used as an independent harrow if desired by detaching from drawbar. Teeth are adjustable and, being diamond shape, furnish two cutting edges.

(14) Osborne Columbia cultivator, 5 teeth: For loosening and cultivating the soil. Can be adjusted to suit the width between rows either in garden or vineyard. Steel frame is strong and rigid and fully braced. All the adjusting levers are conveniently arranged and can be easily operated while the cultivator is in use. Made in five different styles from the plain 5-tooth cultivator to the one complete with all attachments.

10. *The Stover Manufacturing Company, Freeport, Ill.*—This was an exhibit of feed mills, windmills, etc., located to the right of the main stairway on the second floor, the main exhibit being placed at Vincennes, where windmills of the full height and in motion could be shown. (See chapter referring to Vincennes exhibits.) The following descriptions refer to the appliances manufactured by this company, as shown in both exhibit spaces:

(1) Ideal duplex feed mill: Made in a variety of sizes and styles, adapted to grind all kinds of grain into feed for stock and to be operated by any kind of motor—horsepower (sweep or tread), steam, electricity, windmill, water, etc.—from 2 to 40 horsepower. The burrs are double, consisting of double-surface plate running between two single-surface plates. By this arrangement the necessary grinding surface is supplied near the center, where the reduction is accomplished with the least amount of power. Thus a larger amount of grain can be ground than on the general type of mill having two grinding surfaces only arranged at considerable distance from the center. The ears are crushed by two rolls having barbs thereon and revolving toward each other, one at a greater speed than the other. Underneath is a double-concave plate with corrugations, against which the ears are reduced to small particles ready to enter the burrs. A positive force feed carries the grain from each side to each set of grinding surfaces proportionately to the speed, thus supplying the required amount. Safety pins are placed throughout the mill at all points subject to damage through foreign substance entering machine with the grain. The safety pins break, allowing foreign substance to pass out without injury to the mill.

(2) Ideal feed mill and horsepower combined: A grinding mill in combination with a horsepower geared to run at high speed and reduce grain into feed suitable

for stock and for table use—at the same time operate a corn sheller or fodder cutter, or other farm machinery.

(3) Ideal No. 20 ungeared feed mill: An improved construction of grinding mill without gearing, having crushers in the upper part to break ears of corn and reduce it sufficiently to enter the burrs below, where all is ground into good feed. The pitch and angle of crushers and burrs are such as to give large capacity and the best results.

(4) Ideal horsepower: A compound triple-gear machine having an internally geared master wheel that centers itself about the compound gear. The construction combines great strength, lightness of draft, and long life.

(5) Ideal steel tower: Made in 10-foot sections with cross girts 5 feet apart, to hold the corner posts in line and prevent them from buckling; below section No. 2, 20 feet from the top, two sets of braces are used, and where they cross the girts, clamps bind the girts and braces together, preventing the possibility of girts springing out of line and weakening the tower. Both three and four post are regularly made in multiples of 10 feet up to 100 feet high and of varied weights to support different sizes of windmills. The cable wire braces expand and contract with the heat and cold without slackening or overstraining them. Eccentrics are used to strain the braces in the start to the proper tension.

(6) Ideal windmill: Made of steel and galvanized after the parts are formed and fastened together, making a perfect coat impervious to the weather. Is internally backgeared, having three cogs or teeth in mesh as against one in externally geared mills; the gear being inclosed shuts out snow and ice, dirt, etc. Great strength and long life characterize this gear.

(7) Ideal power windmill: Geared to transient motion from the wheel to machinery below, without loss of power and to obtain full power of the wheel from the wind by holding it squarely to it; at the same time the construction is such as to permit the wheel to govern out automatically when the velocity of wind is great enough to endanger the mill or cause it to run at too high a speed. This company also had an exhibit of hardware in another group and section of the Exposition.

11. *The Warder, Bushnell & Glessner Company, Chicago, Ill.*—This exhibit occupied one-half of the space which consumed the north end of the building opposite the main stairway. For the most part, the machines were finished in natural woods with the metal parts in copper and nickel. A post in the center of the space was devoted to displays of machine parts, the word "Champion" conspicuously displayed. Plants distributed here and there contributed to the general artistic effect of the display. The machines exhibited were as follows:

(1) Champion self-binding grain harvester: This machine embodies many new and valuable features to overcome difficulties heretofore common in this class of machinery. Draft light and uniform because of eccentric binder wheel, unique in grain binders, which equalizes the power in proportion to the work to be done. Ball and roller bearings. Relief rake to keep the inner end of finger bar clear of rubbish and start grain up the elevator. Great range of movement of binding mechanism to put band in proper place around bundle, etc.

(2) Champion folding-bar reaper: The framework of this machine is principally of steel. In operation it is quite simple. The rakes are under complete control of the operator. Platform can be folded to pass through narrow openings. Machine is equipped with roller bearings. This reaper is well adapted for handling all conditions of grain crops as well as flax.

(3) Champion draw-cut mower: The new principle of drawing the finger bar from the front instead of pushing it from behind increases the traction of master wheels on

the ground, and gives this mower great advantages. Lost motion may be taken up at either end of the pitman. Finger bar is adjustable, so that knife and pitman may be kept in exact alignment, even after long wear. Most of the parts are under tensile instead of compression or transverse strain, hence great strength with minimum weight.

(4) Champion haymaker mower: The unique mechanism for transmitting motion to the knife of this mower consists of only two gear wheels, one of which revolves, and the other gyrates around it, thereby imparting the necessary reciprocating motion to the knife, and avoiding the usual up and down motion of pitman at the fly wheel, thus saving much power. Knife works freely when the finger bar is at any angle with the ground up to vertical; thus, this mower is especially valuable for mowing among trees or stumps, or over very rough ground.

12. *The Walter A. Wood Mowing and Reaping Machine Company, Hoosick Falls, N. Y.*—This well-known company occupied a similar space to the above, on the right, at the head of the main stairway. The exhibit was most artistically installed, living plants and small pieces of statuary being employed. A very prominent feature was a superb gold frame of large dimensions inclosing a panel upon which was displayed the medals and decorations awarded to the house or to members thereof. Their machines attractively placed on a limited space were as follows:

(1) Tubular steel mower for two horses: A mower in which steel tubes are used in connection with cast-iron frame fitted with steel roller bearings in the axle and cross shaft, rolling shoe wheels on the cutter bar, a yielding track clearer, a cutter bar controlled by a foot lever or hand lever, the latter assisted by a spring lift, either steel or cast-iron drive wheels with lugs and cold-rolled steel axle. Is manufactured with wood pitman and provided with an under hitch.

(2) Tubular frame mower for two horses: An inclosed-gear mower with tubular cast-iron frame fitted with roller and ball bearings for the axle and cross shaft and removable brass bearings on the crank shaft. This mower is especially designed for very heavy cutting. It has the floating frame which has long been a distinctive feature of the Walter A. Wood mowers, and has the tilting cutter bar, controlled by a foot lever or hand lever, the latter assisted by a spring lift.

(3) Right hand open rear harvester and binder: This machine is designed for use with two or three horses. It combines a comparatively low elevation of the grain with a drive wheel of large diameter, making it of light draft and large capacity. It has roller bearings in the main drive wheel, grain wheel, cross shaft, rear end of crank shaft and binder driving shaft. It has a steel sheaf carrier and a transport attachment, a twine binder by which the sheaf is tied under a positive pressure which insures freedom from friction of the knotter parts while making a perfectly tight band.

(4) Inclosed-gear reaper: A sweep-rake reaper with automatic rake control, by means of which the operator can, at will, rake the gavel off the platform with every rake—second, third, fourth, or fifth rake. This reaper has removable brass bearings and inclosed gearing and a hinged platform by means of which the machine can be folded up for transport through narrow gateways.

13. *Chicago Flexible Shaft Company, Chicago, Ill.*—This company made a very interesting display on a space of about 100 square feet, the exhibit being located on the left of the stairway leading to the bridge crossing to the Palace of Agriculture.

14. *The Oliver Chilled Plow Company, South Bend, Ind.*—This company proposed a very complete exhibit of their full line of manufactures. Space was allotted, but as it proved insufficient for their purposes it was relinquished, and another smaller space secured upon which to make a display of models only. The exhibit was located to the right of the stairway leading to the bridge, and while the space was small, the display was most attractive, the models being shown in an ebonized oak case, in conformity with the general scheme of wood-work coloration employed in Groups VII and X. It is to be regretted the descriptions of the 25 beautiful models of plows made by this well-known concern and shown on this space were not furnished.

15. *The Milwaukee Harvester Company, Milwaukee, Wis.*—Three machines only were shown on the space allotted to this company, which was located in the center of the building along the eastern wall. The machines displayed were: A harvester, reaper, mower, and a transportation truck. The machines are described as follows:

(1) Milwaukee reaper is supplied with five rakes which travel slowly, delivering gavels in superior shape. Platform is heavily timbered, strong and rigid, easily and quickly folded for transportation; cutter bar is made of angle steel; raising and lowering device is arranged so that a child can operate it. Rake control works automatically; is shielded from dust and dirt, and is frictionless and durable. Rakes can also be controlled independently by a foot lever. Main gear is separated from main frame. Strong bevel gears give steady motion to rakes. Shafts are large and long; gearing is perfectly shielded.

(2) Milwaukee harvester and binder: Main frame and platform in one piece, making a rigid foundation; device whereby machine can be raised and lowered both ends at same time with only one lever; entire weight of machine carried by a spring, avoiding violent shocks and making driving easy; single lever reel, free from latches, simple and effective.

Other features: Perfect tying and compressing mechanism; low cutting-bar; large elevating capacity; few and simple gears. Constructed on plan of strength, durability, easy operation, and lightness of draft.

(3) The Milwaukee mower has a strong wide frame with large wheels and axle. Being a chain-gear machine, it permits of a genuine horizontal crank shaft, causing the pitman to run without wobbling and consequent friction, loss of power, and wear. The pitman connections are perfect; the pitman box is supplied with brass bushing and large oil chamber, insuring thorough lubrication at all times. With wheels having four ratchet pawls in connection with chain gear, the knife will start immediately team moves; hence, backing is unnecessary. Cutter-bar is supplied with wearing plates and adjustable subsoles. The carrying spring causes bar to float, enabling both ends to follow any surface.

16. *The Whitman Agricultural Company, St. Louis, Mo.*—The display made by this well-known company was a very small one owing to the fact that their manufactures are large and bulky, and only a limited space was available. They made the most of the space, however, placing upon it two of their justly celebrated hay presses, one of these being a full-size horsepower press, the other a steam press. No descriptions of the exhibits were received.

17. *The Withington & Cooley Manufacturing Company, Jackson, Mich.*—This concern displayed small farm tools and other hand tools which were artistically displayed in a revolving case 7 feet in diameter and about 9 feet high. A wall display of fork handles completed the exhibit. The space, triangular in shape, was at the extreme south-east end of the building over one of the main entrances. Lack of space in this report will preclude description of the 50 or more devices shown, which included 20 forms of hoes, half as many of rakes, a full line of forks, corn hooks, thistle cutters, etc. The descriptions of several interesting implements, out of the many exhibited, however, is appended:

(1) The Ivanhoe field and garden hoe: For general field and garden use. This is a socket hoe of graceful and correct design made from the finest selected crucible steel, carefully tempered and highly polished, set to a handle of select second-growth white ash of approved pattern, all finely finished. The company claims the use of finest materials throughout, with careful and correct workmanship.

(2) Mortar mixer: A strong serviceable hoe of a pattern especially adapted to the work of mixing mortar, the two holes in the blade allowing the mortar to flow through as the hoe is drawn back and forth, greatly increasing the efficiency of the tool; made from high grade steel with blades 9 or 10 inches wide and set to strong ash handle with ferule and overcap; high-class workmanship, strength, durability, and efficiency.

(3) Vegetable scoop fork, 10 tines: For handling corn, potatoes, beets, or other vegetables. The tines lie flat, two-thirds of the distance from the end, so that with one push the fork loads fully and without raising the points and bruising the vegetables, as is the case with ordinary forks. The points are flat and blunt, tines close together and with outside tines raised making a basket-shaped tool of large capacity. It is carefully tempered, always retains its shape, is light, strong, and durable, and does not pick up dirt like a shovel, is made from one solid piece of the highest grade crucible steel, carefully tempered and polished, set to a "D Grip" handle of second-growth white ash; all highly finished.

(4) Solid bow rake: For garden or lawn use; a practicable, graceful, and serviceable pattern of superior strength. The teeth, head, and bow shank are forged from a single piece of steel, no welding of parts—a rake of superior strength, rigidity, and graceful pattern; made from the highest grade crucible steel carefully tempered and polished and set to selected second-growth white-ash handles.

THIRD FLOOR.

18. *H. J. Heinz, Pittsburg, Pa.*—This was not an exhibit but a demonstration booth, located in the space devoted to the United States corn kitchen. The Heinz exhibit of pickles, soups, and other food products was located on the main space in the palace of agriculture.

19. *George M. Ertel & Co., Quincy, Ill.*—This was an exhibit of incubators and brooders, which occupied about 120 square feet of individual allotted space in this building. Four exhibit articles were placed, no descriptions of these being available for this report.

20. *The Coldwell Lawn Mower Company, Newburgh, N. Y.*—An exhibit of lawn mowers. This concern made an extensive exhibit of

their manufactures on the space devoted to horticulture on the right bank of the Seine. (See report on Group VIII, Horticulture.)

22. *Whitman & Barnes Company, Akron, Ohio.*—This company made a superb exhibit of agricultural-implement parts, drop forgings, and small tools, which were installed in a handsome ebonized oak case in the northeast corner of the annex. The space occupied was 250 square feet. While a large number of small exhibit articles were shown, the catalogue sheets refer to three groups of exhibits as follows:

(1) Small drop forgings, wrenches, etc. These goods are made of the best iron and steel and bear our trade-mark, which is a guaranty of quality and finish.

(2) Mowing and reaping knives, sickle sections, guards, and guard plates. These goods are furnished as cutting parts for mowing and reaping machines made in the United States, and other countries. They are made of the best American steel and are fully warranted. These goods have been manufactured by the company since 1846.

(3) Twist drills, reamers, spring cutters, and kegs, etc. These goods are made of the very best cast steel, warranted in every particular as to the quality of material and workmanship and bear the trade-mark of the company, which is a guaranty of quality and finish.

23. *P. M. Sharples, Westchester, Pa.*—This exhibit was devoted to cream separators and but for lack of space would have been installed in the main palace of agriculture, with the exhibits in class 37. It occupied about 120 square feet of space. No description was received.

24. *Deering Harvester Company, Chicago, Ill.*—On this space was placed a special exhibit in the form of a picturesque model of a Deering corn harvester at work in the field. This exhibit, a miniature working model of the Deering corn binder, with its sculptured operator and team, its standing rows of corn and its neatly tied bundles, formed an attractive feature in the space adjacent to the United States corn kitchen. This is the first corn binder that was ever publicly exhibited, and was shown at the Chicago Exposition of 1893. Now nearly 50,000 corn harvesters are required to satisfy the annual demand of the world.

This exhibit was especially interesting to foreigners unfamiliar with corn and helped them to realize how it is that the United States can furnish to Europe this great food product at so cheap a price. In this machine the row advanced upon is gathered by chains upon either side, leaning and broken stalks brought to position and the mass prostrated in a receptacle, in which it is bound and from which it is moved automatically to a bundle carrier; by the bundle carrier it is deposited upon the ground ready to be shocked.

The advantages are mainly the avoidance of all mechanism for controlling standing stalks while binding. The machine is simple and, by ball and roller bearings, excessive draft is avoided.

25. *Johnson & Field Manufacturing Company, Racine, Wis.*—An exhibit of fanning mills, occupying about 250 square feet of space near the entrance to the corn kitchen, described as follows:

No. 1 farm mill: Is adapted for cleaning and grading all kinds of grain and field seed, beans, pease, rice, coffee, lentils, and other cereals. The main features are large capacity (considering size) and improved construction, the gearing being placed on inside of machine and drums fastened to the frame by cast-iron half circles, thereby protecting the wood circle; the feed is regulated by a screw to raise and lower the slide in the hopper.

No. 2 farm mill: Is constructed same as the No. 1, and has the same features for cleaning and grading, but has a larger capacity, being 6 inches wider.

No. 2 warehouse mill: Is constructed on the same principle as the farm mills, but is much larger, and the woodwork, as well as the irons, made a great deal heavier, and is used principally where a large capacity is required. This can be operated by either hand or power.

No. 4 warehouse mill: Is still larger, and adapted for warehouse and elevator purposes, is constructed a great deal heavier in every way than the No. 2 warehouse, and can only be operated by power. This mill has all the features mentioned in the other mills.

21. *The McCormick Harvesting Machine Company, Chicago, Ill.*—

RETROSPECTIVE EXHIBIT OF HARVESTING MACHINERY, AS SHOWN BY M'CORMICK MACHINES, 1831-1900, M'CORMICK HARVESTING MACHINE COMPANY, IN THE AGRICULTURAL ANNEX.¹

The founder of this house having invented and built his first reaper in 1831, and having been a pioneer in the introduction and development of harvesting machines, and the house being the oldest builder of such machine, and having a machine of its own manufacture in each great step of progress, determined, when it was granted the privilege of making a retrospective exhibit, to confine its models to those of machines invented, perfected, or built by Cyrus H. McCormick and the house he founded. The space allotted for the exhibit was on the third floor of the agricultural annex, measuring 8 by 32 feet. Two handsome ebonized-oak cases, each covering 4 by 10 feet, and fitted with plate-glass shelves, served to contain the 17 models, all of which were of McCormick machines. They were made in the most perfect manner and were operated by an electric motor. They were equipped with handsome models of horses harnessed to them to show the method of propulsion, and models of men were placed in the seats of the machines and on the horses to show how the machines were driven. The necessary attendants for the machines were also represented in

¹ All reference to priority of conception or ingenuity of invention, development or perfection of parts or entire harvesting machines, descriptions or reference to such conceptions, inventions, features of machines, statements made in catalogues or on exhibit labels, and dates, have either been supplied by the exhibitors or compiled from data submitted by them, and the exhibitors are therefore responsible for all such statements.

models of men, each carved to faithfully represent the special work of attending on the different machines. To the farmer of the Old World who had harvested his crop with the sickle, or, perchance, with one of the simplest forms of reapers, this exhibit must have been a revelation, showing the superior equipment of the farmer of the United States.

The great steps of progress in the industry were represented by the following models, viz: (1) The first practical reaper severing the grain by means of a reciprocating knife moving through fixed fingers, a platform to receive the grain and hold it until a bundle has accumulated, a reel to hold the grain to the knife and incline it upon the platform, and a divider to separate the swath being cut from the grain left standing. (2) The attendant that walked beside the machine to draw the gavel from the platform is mounted on the machine in such a position that he can by a natural sweep of his body rake the gavel from the platform. (5) The attendant has been replaced by the automatic rake that sweeps the gavel from the platform to the side of the machine. (6) The cutting bar of the mower is pivoted to a frame that is in turn pivoted to the frame of the machine, thus giving the bar a capacity to conform to uneven surfaces. (7) The men that walked through the field binding the gavels are carried on the machine. (8) The men on the machine doing the binding are replaced by an automatic attachment that binds the grain and discharges it in bound bundles, the binding material being wire. (9) The wire binding attachment is replaced by an automatic attachment that uses cord for a binding material and which automatically makes the bundles of the same size. (13) The low level self-binding harvester and binder to cut and bind the grain into bundles, all the operations being performed on the plane of the cutting apparatus. (16) Attachments to transport the machine from field to field and to carry the bundles into windrows for convenience in shocking are added. (17) The corn (maize) self-binding harvester for cutting and binding the corn (maize) into bundles and carrying these into windrows.

These are the great fundamental steps of progress in harvesting grain, and in each of them the McCormick Company have had practical machines. It is the only manufacturer that could have made a retrospective exhibit of the entire industry from machines of its own manufacture. With this idea it accepted the undertaking of making a retrospective exhibit that should show all the great steps of progress in machines of one manufacture.

It is to be regretted that the limited space of this report precludes giving full descriptions of these models, and a simple list, in the words of the manufacturers, is therefore appended:

(1) McCormick reaper of 1831. United States patent, Cyrus H. McCormick, 1834. This machine was invented and built by Cyrus H. McCormick in 1831, and was operated successfully in the harvest of that year on the farm of John Steele, Steele's Tavern, Virginia.

(2) McCormick reaper of 1845-1847. United States patents, Cyrus H. McCormick, 1834, 1845, and 1847. To the original reaper of 1831 has been added an improvement in the cutting apparatus and a seat for the raker.

(3) McCormick reaper of 1851. United States patents, Cyrus H. McCormick, 1845 and 1847. This machine was shown at the First World's Fair, London, 1851.

(4) McCormick mower of 1855. United States patents, Cyrus H. McCormick, 1845 and 1847; Obed Hussey, 1847.

(5) McCormick reaper of 1863. United States patents, Cyrus H. McCormick, 1858; McClintock Young, jr., 1858, 1859, and 1860. The automatic self-raking device of McClintock Young, jr., has been added to the reaper, whereby the gavels are deposited on the ground at the side of the machine.

(6) McCormick double-frame mower of 1867. United States patent, McCormick & Erpelding, 1867. The cutting apparatus is hinged to a supplemental frame, which is in turn hinged to the main frame, thus giving flexibility to the cutter bar.

(7) McCormick hand-binding harvester of 1875. United States patents, L. J. McCormick, 1875; W. R. Baker, 1875. This model represents the harvester as developed by Mann, Sylla & Adams and Marsh, with improvements.

(8) McCormick wire self-binding harvester of 1872. United States patents, Charles B. Withington, 1872; W. R. Baker, 1876; Charles B. Withington, 1876. Withington and Baker replaced the binder's stand on the hand-binding harvester with the double-spool wire-binding attachment, which receives the grain and automatically binds it into compact bundles.

(9) Automatic self-sizing binding attachment. United States patent, Marquis L. Gorham, 1875. This model marks the substitution of twine instead of wire for binding grain.

(10) McCormick iron mower of 1878. United States patent, W. R. Baker, 1878. One of the early types of iron mowers.

(11) McCormick twine self-binding harvester of 1881. United States patents, Marquis L. Gorham, 1875; John F. Appleby, 1879; Baker & Pridmore, 1886. One of the early twine binders, of the Gorham automatic self-sizing type, as improved by Appleby and Baker & Pridmore.

(12) McCormick sweep-rake reaper of 1882. United States patent, Henry E. Pridmore, 1883. A modern light reaper, of the Dorsey sweep-rake type, as improved by Henry E. Pridmore.

(13) McCormick low-down self-binding harvester. United States patents, James R. Severance, 1883-1891. This machine binds the grain and the fork discharges the bundle at the rear.

(14) McCormick draw-cut mower of 1888. United States patent, Henry E. Pridmore, 1890. A modern steel mower in use at the present time in all countries where mowing is done.

(15) McCormick corn (maize) harvester of 1890 (push pattern). United States patent, Albert S. Peck, 1892. This machine harvests corn planted in rows. It severs the stalks near the roots, forming them into bundles standing on end, and binds the bundles with a cord.

(16) McCormick steel self-binding harvester of 1892. United States patents, Henry E. Pridmore, 1888, 1892, 1893, 1896, 1898; John W. Pridmore, 1898.

(17) McCormick vertical corn (maize) harvester. United States patents, Albert S. Peck, 1892; John W. Pridmore, 1897; H. E. Pridmore, 1898; Edward A. Johnston, 1899.

EXHIBITS AT VINCENNES.

Owing to the large number of exhibits which had been allotted space under Groups VII and X on Champ de Mars and the necessity for limiting individual allotments to small areas, it was impossible to locate any concerns desiring to make working displays within the Exposition

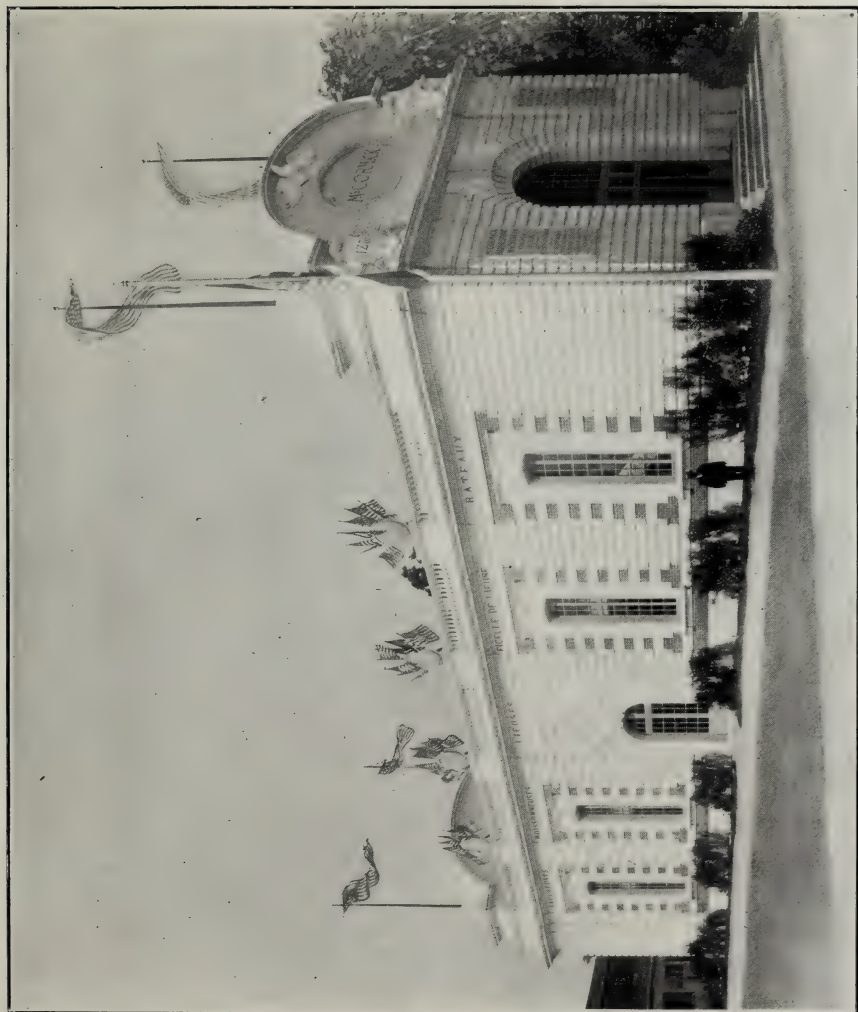
proper. It was fortunate, therefore, that my department was permitted to place a number of its working exhibits at Vincennes, where the United States was to be represented by important interests, chiefly in the departments on machinery and transportation.

Out of the many applications for large blocks of space in my department for the purpose of presenting working exhibits, five concerns finally accepted allotments at Vincennes, covering a total area of 8,218 square feet. With one exception these concerns were also represented in the main agricultural display on Champ de Mars upon areas which, while limited, practically gave them all the advantages of the other exhibitors in the main Exposition.

Parc Vincennes is located on the east side of Paris, near Charenton, and just at the gates of the city, though about 7 miles from the principal Exposition. It was accessible by means of the city system of tramways, by the Metropolitan Underground Railway, and by the river boats. The more important machine, tool, and railway exhibits, including the automobile, bicycle, and sporting displays, were here grouped together, so that the annex exhibition was in every sense international in character, and large numbers of visitors thronged its buildings, it being remarked that a majority of those who took the trouble to journey to Vincennes were interested visitors, and not the mere sight-seeing public. The displays classified in my department which were at Vincennes were as follows:

The McCormick Harvesting Machine Company, of Chicago, Ill.—This large and interesting exhibit was located in a special building erected by the company on an area of 32 by 108 feet, and therefore occupied nearly 3,500 square feet of ground space.

The building itself, an illustration of which is given, was designed in Louis XIV style of architecture by M. Adolpho Bocage, the material used being wood, brick, and staff. The color scheme of the interior decoration was red and green, various parts of harvesting machines being employed in the decoration. The floor space of the interior was divided into two parts by a central structure with panoramic features, to be viewed from the two sides. One of these was a miniature scene showing the works of the company, with moving models of teams, cars, and boats, and men engaged in various occupations. The other side was devoted to a scene in miniature of an American farm, with moving figures and models depicted by means of curtains, one behind another, upon which the scene was painted, the moving models projecting above and moving across the landscape of the scene beyond. Around the walls of the building was placed a line of flags of all nations, and upon the walls were displayed photographs showing the machines of this company in many portions of the globe where they are used. Two pairs of stairs led, one on each side, to two galleries which led to a room in the rear part of the building,



F-26. PAVILION OF THE MCCORMICK HARVESTING MACHINE COMPANY AT VINCENNES.

planned for the giving of lectures relating to methods of American farming and to the use of the McCormick machines.

The photographic exhibit consisted of 150 bromide enlargements, which were placed upon the walls, the negatives having been selected from over 1,300 photographs secured in every country where grain or grass is harvested. Besides these enlargements, as many more were displayed in wing frames placed in the different parts of the building, easily accessible to the public, while representations of the output of the works of the McCormick Harvesting Machine Company and medals of awards and other forms of emoluments received by this company at former expositions were also shown.

Following is a description of the more important machines displayed by the McCormick Company in this special building at Parc Vincennes, the descriptions being supplied by the exhibitor:

Reproduction of the original McCormick reaper of 1831.—The original of this reaper was invented and built by Cyrus H. McCormick on his father's plantation at Steeles Tavern, Va., and cut wheat and oats in the harvest of 1831. In this original reaper there appeared for the first time a machine capable of supplanting the grain cradle by harvesting grain mechanically. The elements contained in this machine have never been superseded in the construction of reapers—namely, the reciprocating knife driven by a crank through fixed fingers; the platform to receive the grain; the reel to incline the grain upon the platform; the divider to separate the swath to be cut; the two-wheeled cart construction, the most of the weight being placed upon one wheel to give traction to operate the moving parts. These elements in their same general arrangement and interdependence of parts have been found in every successful reaper since the invention of this machine.

The "Old Blue" machine—A McCormick reaper of 1853.—This old machine harvested the grain crops of a large American farm for twenty-seven years. When taken to the fields again last year it performed its work well. The original purchaser abandoned this machine only upon the advent of the self-binding harvester. The elements of the original reaper of 1831 are here found with the added improvements of seats, which are provided for the raker and for the driver. The cutting knife is also improved by being scalloped, thus adding to the former draw-cut the shearing principle. At the International Exhibition of 1855, Paris, this machine was awarded the grand prize.

One-horse daisy reaper.—This machine represents a return to the principles of the first successful reaper, that invented and built by Cyrus H. McCormick in 1831. The machines are identical in the following features, viz: The machine is drawn by a horse walking beside the standing grain. The machine is mounted on two wheels, the greater part of the weight on the wheel behind the horse, thus furnishing traction to operate the working parts. The machine severs the grain by means of a reciprocating knife working through fixed fingers and driven by a crank. The machine has a platform on which the grain falls as it is severed and upon which it accumulates until sufficient has been received to form a gavel, and then it is raked off to the side out of the way of the team in its next round of the field. In the first McCormick reaper a man walking beside the machine raked the gavel off by hand, while in the present machine an automatic device sweeps it from the platform. The machine has a divider to separate the grain to be cut from that to be left standing. The automatic raking device performs also the work of reeling the grain and holding it to the knife, the same as the reel in the first McCormick machine. The added feature of raking is the one step of improvement, and the arms that sweep the platform are

under the control of the driver, so that gavels of any desired size may be raked. The adjustment for raising the machine to cut high are screws that are easily worked, while the first McCormick machine had only brackets with holes and pins. There is no example in any art of a modern machine that has undergone less changes from the first principles.

McCormick manual-delivery reaper.—To the McCormick mower is added a platform by pivoting it to the finger bar of the machine and the bar is supported at the desired height from the ground by the addition of ground wheels at each end of the bar. An attendant is placed on the machine with a rake to incline the grain onto the platform, and when sufficient has accumulated to form a gavel he tilts the platform, thus allowing the gavel to slide to the ground. A divider is added to divide the swath from the rest of the grain. On small farms this machine will do all the work of reaping and mowing.

McCormick one-horse mower.—This mower is smaller than the regular two-horse mowers. With a shorter cutting bar, smaller wheels, and lighter frame, it is made for use on one-horse farms. It has the draft carried to the cutting bar by means of a rod extending from the singletree. The cutting bar is thus pulled over the ground and is not pushed from the frame of the mower. Its cutting apparatus is made with the greatest care. It is fitted with antifriction bearings to make the draft light for the one horse.

The McCormick corn shredder and husker.—Eighty-five million acres of corn (maize) in the United States is largely consumed at home by 18 million horses and mules, 50 million cattle, and 86 million sheep and swine. The usual method of harvesting is to gather the ears from the stalks, leaving them in the field to encumber the ground at the next planting season. The McCormick corn binder and this machine are changing this antiquated system and making available more than one-third of the food value of the corn planted.

A pair of parallel spring-pressed bar rolls are placed across the mouth of the machine to which the stalks are fed butts first. These rolls pass the stalks between them to a cylinder with radially arranged knives, which cut and tear the stalks into shreds, the ears are pinched from the stalks by the rolls and fall upon parallel horizontal bar rolls that strip them of husks, when they are delivered into a wagon or crib. The shredded fodder passes into a fan under high speed and is blown to the stack or mow. A screen upon which the air blast is directed cleans any accidentally shelled corn.

McCormick header harvester.—It is very simple. The main framing of the machine surrounds the large drive wheel, which is placed on the outer side of the machine. The elevator is supported from this side, and traction is assured to give motion to the long knife and endless apron. The tongue is attached to the center of resistance, which is at a point within the swath being cut. The platform is counterbalanced by strong springs, whereby the driver easily adjusts it for grain of varying lengths as the machine is at work. The whole machine is constructed of steel and malleable and cast iron, and its construction is thought to be an example of the best in the art of harvester building. Its bearings are fitted with roller bearings; its aprons are of heavy ducking and fitted with wide straps at both edges and in the center; its platform is sheet steel; its drive chain is pinned with steel; its elevators are steel and braced to withstand hard knocks from the wagons; its gearing is reduced to a minimum, and its balance is so perfect that it requires little attention from the driver to keep it cutting a full swath.

The McCormick binding attachment.—No tools on the farm, in fact but few tools in any art, are more ingenious and called upon to operate with unvarying regularity under more trying circumstances than the attachment for the harvester that apportion the cut crop into bundles and binds and discharges them. The McCormick device is practical, and the attachment here shown is a marvel, capable as it is of

perperforming its difficult work with so few parts and movements. The knot-tying device has but two moving parts, the knotter hook making one revolution and the holding disk making but half of one revolution in the tying of the bundle. The ingenuity displayed in this feature, coupled with the simplicity of its construction, has no equal in harvesting machinery. Its economy of twine is remarkable. The feature of combining the trip and compressor spring so that the machine is set in motion by the grain acting upon the spring on a short leverage and acting upon the same spring on a long leverage for compressing the bundle is the latest in binder invention. This attachment is protected by patents belonging to the McCormick Company.

The McCormick bundle carrier.—This device will carry many bundles. It has great strength. A strong spring aids the driver in its operation and also brings it back to receiving position after it has folded to the side of the machine to pass obstruction. It discharges the bundles all at once and so gently as not to shell any grain. The windrows are in line and the driver can work the carrier day after day without fatigue.

Main frame and wheel of a McCormick self-binding harvester.—The main frame is remarkable as being of one piece of channel steel, bent at the corners. A square tube sill ties the frame together, giving it great torsional strength. The main cross-shaft has self-aligning boxes fitted with removable roller bearings. The main corner bearing has a removable box also fitted with a removable roller bearing. The main chain is fitted with hardened-steel pins that are riveted into the bars of the links. The pins being covered, dirt is kept from the bearings and durability of the chain is greatly increased. The clutch mechanism on the main cross shaft is entirely shielded from dirt, and the dog has a hardened-steel roller in its point, whereby it rolls out of engagement, greatly prolonging the durability of the clutch. The main-wheel tire is of spring steel, with 9-inch tread face, fitted with angle-iron lugs. The thickened edges give added strength and prevent breakage. The double steel spokes are thickened at their extremities where they pass through the tire. Nuts on the spokes give tension, thus forming a spring wheel. The hub has removable roller bearings. The light connecting rod from the main frame to the raising device (McCormick's patent) makes the operation of the raising device very light, strong, and durable.

McCormick simple knotter.—The knot is tied on this device with only one revolution of the knotting hook and a half revolution of the holder disk. The end of the cord is grasped with a firm hold during the formation of the bundle, which grasp is gradually lessened as cord is required to form the knot, and then a secondary hold is taken when sufficient cord is drawn out. This is performed by the half revolution of the holder disk, and, further, as the disk carries the knife the cords are cut by this one movement. The rigid stop finger for the cord slot, around the end of which the cords are carried by the revolution of the knotting hook, dispenses with swinging gates, and the discharge arms strip the loop and form the knot, which also dispenses with the usual moving stripper. This device is simple, accurate, durable, and economical in the use of cord. It is patented and found on all McCormick machines.

McCormick transport.—The main wheel of the harvester, with its wide face and deep lugs, adapted to carry the machine over the soft soil of the field and give traction to the moving parts, is not adapted for the transportation of the machine from field to field over hard and stony roads. It is not, therefore, practicable to fold the platform and use the regular wheels of the machine on the road. The McCormick transport is formed of a heavy steel tube axle that is fitted with wheels having steel-tired rims and spokes to withstand the hard and rocky roads. The tongue is attached to the harvester by spring bolts, and is quickly disconnected. A supplemental draft bar is extended from the strong seat-supporting plank to the main divider sill, and the tongue is attached thereto and to a loop formed in the grain-wheel bridle. The driver, without help, can load the harvester upon this truck in four minutes. This

truck has great strength, simplicity, handiness, the machine is perfectly balanced on the truck, and is transported more nearly horizontal than any other.

The McCormick automower.—In the year 1891 the McCormick Harvesting Machine Company illustrated in its catalogue an auto-truck for farm work, and showed it in use in drawing a self-binding harvester at work in harvesting grain. Since that time it has conducted various experiments with different forms of engines for use on farm trucks. It had on exhibition at its building at Parc Vincennes an automower, which was shown in operation daily upon the grounds, and which was taken to a field near Mitry, France, August 30, 1900, where field trials were held, under the auspices of the Société Agricole de Meaux, before agriculturists of renown, where it demonstrated its perfect practicability as a mowing machine. It cut the grass with the greatest of ease, and was quickly turned from side to side, backed, stopped, and started with the utmost freedom on the part of the operator. On a three-wheeled angular truck having the usual gearing and cutting apparatus of a mowing machine was mounted a 10-horsepower double-cylinder gasoline motor, which was so connected to the truck as to propel it both backward and forward and also to actuate the cutting device. The finger bar of the mower was controlled from the seat by means of a lever and strong spring, so that it could be thrown up vertically to the side of the machine to pass obstructions and for transportation when moving from field to field.

The operation of this machine at Parc Vincennes excited great interest, and its practical operation in the field demonstrated the utility of the construction.

The exhibit of photographs was very large and interesting. These consisted of 150 bromide enlargements framed and hung on the walls. The negatives from which these were made were selected with care from a collection of more than 1,300 photographs secured during the past year from every country where grain and grass are harvested. They include scenes showing the primitive methods still in vogue in districts and countries where machinery has not yet been extensively introduced; typical farm scenes from every section of the United States and every country of Europe, with machines in operation in the fields; a series illustrating the principal progressive steps in the development of harvesting machinery; views of factory buildings, exterior and interior, and of branch warehouses and agency buildings throughout America and Europe; scenes showing methods of transportation of machines and of loading and unloading from trains and boats. Besides those framed and hung on the walls, there are as many more displayed in swinging frames, making in all over 300 photographs. As no list of these photographs was submitted, the subjects can not be enumerated.

The Indo-Egyptian Compress Company, of New York and Boston.—This company made a very interesting exhibit illustrating the compressing of cotton and other substances into round bales by means of the Lowry system. It occupied a space of 2,418 square feet, and was one of the most striking working exhibits in any department of machinery. Upon entering the machinery building the visitor was shown a highly finished Lowry press, about 9 feet in height, of iron, steel, and wood construction, making round cotton bales of a high density and at a minimum baling charge. Loose cotton was openly

fed by power into a hopper through a stationary head plate provided with radial grooves, underneath which a cylindrical open-ended chamber revolved, the inclined sides of which formed an abutment and produced the required density by a simple but most powerful process. The material in the revolving chamber bulges slightly through the slots, intermeshing its fibers with the loose material in the hopper and continuously drawing the same into the chamber, the bore of the chamber being larger at the top than the bottom retards the progress of the material—in fact, causes the material to bale itself. After a certain length of the column of material has emerged from the chamber, which mass is supported by a yielding ram, the bale is cut off at any desired length not exceeding 36 inches, and means are provided to hold it against expansion while the bale is being removed from the base and the permanent wires applied.

The output of the machine was of great interest to thousands of visitors. The cotton treated by the Exposition press was formed into bales 36 inches long by 18 inches in diameter, measuring on an average 5.3 cubic feet each, with a weight of about 250 pounds and having a density of about 48 pounds to the cubic foot. This density is almost startling when compared with that of the ordinary American compressed square cotton bale, millions of which are now exported with a density not exceeding 22 pounds per cubic foot.

Next to the density, an important point was the extreme neatness of the package, which is entirely lacking in the dilapidated appearance so characteristic of ordinary cotton bales, and as a consequence no loose cotton is exposed in this system to become dirty, water soaked, or wasted. These bales will stow on cars or shipboard in considerably less than one-half the space required for the American square bale of cotton, thus allowing cars to be loaded to their full capacity and vessels to their water line.

The Lowry press produces bales of high density in other materials and fibers, such as hay, straw, wool, jute, hemp, flax, sisal, manila, rags, etc., bales of which were exhibited in cases, together with photographs of existing plants in commercial use, within the space occupied by the Indo-Egyptian Compress Company. In this exhibit were also seen bales of scrap tin, paper, and tobacco stems.

Taken altogether, the exhibit was one of great interest and one making a most creditable example of an American invention applied with shrewdness in seeking every possible means for increasing our foreign trade by lessening the cost of production and transportation.

A gold medal was awarded to the Indo-Egyptian Compress Company for this meritorious exhibit. It was a point of attraction for all cotton spinners of Europe and textile manufacturers, and was visited and reported upon by many military attachés of the various governments of Europe residing in Paris.

The Aermotor Company, Chicago, Ill.—The exhibit of this concern occupied about 725 square feet of space just in the rear of the United States Machinery Building and was not represented on Champ de Mars.

The exhibit consisted of four aermotors or improved steel windmills, respectively 16, 14, 12, and 10 feet in diameter, mounted on galvanized steel towers 80, 70, 60, and 50 feet high, the whole covering a space of 33 feet square. In the center were shown many styles of pumps, besides saws, grinders, and other windmill attachments. The aermotors were in active operation, driving pumps, grinders, saws, etc., thus giving a practical demonstration of the manner in which wind power can be utilized for all kinds of work. The exhibit is described as follows:

(1) The largest aermotor, 16 feet in diameter, was mounted on a steel tower, 80 feet high, and was used to operate an irrigation pump, 36 inches in diameter. This pump was the largest ever driven by a windmill and attracted great attention as it delivered nearly 300 liters of water per stroke, and clearly showed the efficiency of the aermotor for irrigation or drainage work.

(2) The 14-foot aermotor was of the type known as the geared or power aermotor, and was placed on a steel tower 70 feet high. This type of mill gives a rotary motion to a steel shaft instead of the reciprocating motion as used for pumping water only. This aermotor was used to drive a set of foot gears and a 26-inch circular saw suitable for sawing firewood, poles, etc.

(3) The 12-foot aermotor was erected on a steel tower 60 feet high, and was of the same type as the 14-foot wheel. This mill was used to drive a feed grinder and a pump jack for operating a pump. Both these mills illustrated the many improvements made by the Aermotor Company in power mills, especially in the matter of automatic-governing devices.

(4) The 10-foot aermotor was erected on a tower 50 feet high and was used as a sample of the ordinary windmill required by farmers and others for pumping water only.

The Stover Manufacturing Company, Freeport, Ill.—This concern also made a handsome windmill exhibit at Vincennes, although it was represented on the second floor of the Agricultural Annex, Champ de Mars. At Vincennes the company erected a 100-foot 4-post steel tower, upon which was installed a 12-foot Ideal back-geared windmill, which, owing to the favorable wind force, was able to be operated almost continually throughout the Exposition. At the base of the steel tower a house was constructed which inclosed the pump exhibit operated by the windmill above, consisting of several sizes of pumping and power mills. An exhibit of grinding mills was also shown. For description of the appliances and mills exhibited by this concern, see the chapter relating to agricultural machinery, under the head of the Stover Manufacturing Company.

The Reliable Incubator and Brooder Company, of Quincy, Ill.—This company erected a very pretty pavilion covering about 1,000 square feet of space, near the Stover windmill exhibit. It was one of the earliest exhibits installed at Vincennes, and the management claims to

have entertained 90,000 visitors during the Exposition, including kings and potentates. The model structure erected contained seven incubators, 50 to 300 eggs capacity, of the simple incubator and the incubator and brooder combined, using the hot-air and hot-water systems, in which the entire system of incubation was carried out, chicks being hatched every day and mothered in the combined incubator and brooder, and finally transferred to a brooder of the hot-air out-door type. A sectional model of the combined incubator and brooder was shown, each part of which could be dismounted, showing the principle and theory, the different kinds and qualities of materials used in the construction, etc.—the general idea of the exhibit being to show the advance and improvements made in these machines as produced by the Reliable Incubator and Brooder Company.

This concern was also represented in the main exhibit in the Palace of Agriculture, Champ de Mars, where were exhibited two working models of the hot-water incubator and brooder combined and one hot-air out-door brooder, constructed in size to meet the general requirements of the Government display, which was made in uniform glass cases.

Several other exhibits in Groups VII and X were allotted space at Vincennes, but on account of the expense for construction of special buildings for their occupancy the applications were withdrawn.

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